206
LIBRARY
CURRENT SERIAL RECORD
APR 30 1943
U.S. DEPARTMENT OF AGRICULTURE

FARMERS DIGEST

MAY, 1943

Volume 7
Number 1

25¢ a Copy
$2.00 a Year

Cutting Labor Corners	*Successful Farming*	1
The Good Acre	*Land and Home*	5
Selecting the Young Herd Sire	*Holstein-Friesian World*	9
Seeding Legumes and Grasses	*American Agriculturist*	13
Timed Milking Saves Labor	*Electricity on the Farm*	16
What is Cheap Land?	*Nation's Agriculture*	17
The Fertilization of Pastures	*Better Crops*	21
They Like Lespedeza	*Farm Journal and Farmers Wife*	27
Hog-Lot Strategy	*Kansas Farmer*	28
Domestic Rabbits for Home Consumption	*Western Farm Life*	32
Swine Erysipelas	*Hog Breeder*	34
Range Management	*The Cattleman*	37
Beef Production Can Be Stepped Up	*American Hereford Journal*	42
Trends in Fertilizing Apple Orchards	*New England Homestead*	44
Broilers Grown in Greenhouse	*Ohio Farmer*	47
Nicking in Dairy Cattle Breeding	*Ayrshire Digest*	50
Foolproof Hen Feeding	*Capper's Farmer*	55
Tobacco Plant-bed Management	*Kentucky Farmers Home Journal*	58
Cryolite—An Available Insecticide	*Pacific Rural Press*	61
A Model for Marketing	*Michigan Farmer*	63
Raising and Marketing Squabs	*Rural New-Yorker*	65
Plan to Dry, Store and Can	*Eastern States Cooperator*	67
Humus for Production	*California Cultivator*	71
Fish Meal—Its Production and Use	*American Feed Trade*	75
Turkey Flock Nets $3.12 Per Bird	*Dakota Farmer*	78
Our Soils in Selected Service	*William A. Albrecht*	79
For the Farmer's Library		85
Prize Essay Contest		

638698
47-50

The Farmer's Digest

EDITORIAL STAFF:

Editor—L. Bush-Brown Assistant Editor—C. Leavitt Dyer

Business Manager—A. E. Heick

Associate Editors—
John A. Andrew, Jr., James Bush-Brown, Ruth Patrick

ADVISORY EDITORIAL STAFF:

William A. Albrecht
Chairman, Department of Soils
University of Missouri

John D. Beck
Professor of Veterinary Medicine
University of Pennsylvania

Hugh H. Bennett
Chief, U. S. Soil Conservation Service

D. B. Johnstone-Wallace
Assistant Professor, Department of Agronomy
Cornell University

H. J. Reed
Dean of the College of Agriculture
Director of the Experiment Station
Purdue University

W. T. Spanton
Chief, Agricultural Education Service
U. S. Office of Education

Howard B. Sprague
New Jersey Agricultural Experiment Station

M. L. Wilson
Director of Extension Work
United States Department of Agriculture

The Farmer's Digest

Published Monthly at Ambler, Pennsylvania
by the Farmer's Digest, Inc.

25c a Copy *1 Year $2.00*

2 Years $3.50 *3 Years $5.00*

Foreign and Canadian Subscripions $2.50 a Year

Entered as second-class matter at the Post Office at Ambler, Pa., May 5, 1937, under act of March 3, 1879

Dyer

trick

2.00

The Farmer's Digest

Volume 7 May, 1943 Number 1

Cutting Labor Corners

527138

Condensed from Successful Farming

E. W. Lehman

University of Illinois

TWENTY-FIVE years ago it took you 17 hours to produce an acre of corn. Today our hours to produce that acre of corn have been more than cut in half—to 8.5 hours an acre if your experience was the same as the group of Illinois farmers studied by the University of Illinois. Try multiplying the number of acres of corn you raise each year by nine (the number of hours saved per acre) and the answer will be the approximate saving in man-hours you made in raising your corn crop this year. You'll be amazed at the size of the figure.

These University of Illinois studies show that you've saved this time thru use of more modern and larger machines, better loading of tractors with more than one implement, and thru traveling more miles an hour.

What's more, further examination indicates that's there's no reason why you can't continue cutting down the man-hours on your farm, thereby alleviating the labor shortage and the scarcity of new machinery.

Here, then, are some methods for labor saving that other farmers already have tried with success.

For some time, of course, individuals have been sharing their equipment and communities have pooled their machines to get the job done. The farmer who shares equipment can use his tractor to pull his neighbor's harrow and drill as well as his own with a saving of power and labor. By combining harrows, rotary hoes, and cultivators, much labor and power can be saved thruout the season on both farms.

A practice followed in some communities where one farmer owns a combine and another a corn picker, is to operate the picker in the early morning when

Reprinted by permission from Successful Farming, Des Moines, Iowa, March, 1943

machine husking results in little loss, and operate the combine as soon as it is dry enough and continue until stopped by darkness or dew.

The raking and burning of soybean straw and cornstalks is a practice that can be eliminated with a saving of labor and a return of fertility and humus to the soil. It is estimated that the value of the nitrogen lost per acre thru burning the soybean straw equals $5. The reason for burning straw is to do a clean job of plowing, but this can be accomplished thru careful plow adjustment, and thru the use of proper equipment such as jointers and coulters, trash shield attachments and drag wires. Cutting stalks with a stalk cutter and disking before plowing each require approximately one-fourth hour an acre and are practices of doubtful value.

Clean plowing is essential in corn borer control. However, according to R. C. Hay, Agricultural Engineering Extension specialist, it is not necessary to disk, cut, or rake and burn cornstalks to do a job of clean plowing. With the proper attachments, farmers are able to plow under as much as 99 percent of all cornstalks. Few corn borers survive if the stalks are plowed under before May 1.

Where the corn borer is not a problem, a satisfactory seedbed can often be prepared by double disking or by the use of the Wheatland disk. Such a unit with a drill attached behind it gets the crop in with one operation.

Where weeds are a problem, the farmer who puts more time on seedbed preparation finds that weed control is not serious. Most farmers have more time to prepare a seedbed than to control weeds later. The ordinary procedure is to plow, disk, and harrow—each a separate operation. By attaching a section of harrow back of the plow, the need of immediate disking is eliminated. Under certain conditions, plowing is unnecessary and a saving of 20 to 25 percent in time and fuel can be made by simply double-disking the land for the seedbed.

Where wheat follows soybeans in the rotation, the disking and drilling are often accomplished in one operation. Paul McHenry of Champaign County, Illinois, attaches a wheat drill directly back of the combine when combining the bean crop. Drilling and combining in one operation increased the time about nine minutes an acre and increased the fuel used by the tractor eight-tenths of a gallon an acre.

John Nagel of Jo Daviess County, Illinois, has developed a scheme for seeding and disking oats in cornstalks in one operation. A regular seeder is mounted on the tractor hitch without interfering with the hookup be-

tween the tractor and the disk harrow. The support for the seeder consists of two short two-by-fours fastened to the hitch and extended out just far enough so the seeder will clear the back end of the tractor when it is set in place. Two strap irons are attached from the top of the seeder to the tractor axle to hold it rigidly.

The seeder is driven by a chain from a sprocket welded to a short pipe extension, about three inches in diameter, slipped over the end of the tractor axle and fastened to it. A lever is conveniently located to throw the seeder out of gear when going around the ends.

With this method, the job is done with a once-over operation and it's a one-man job. The old method still used by too many farmers calls for the seeding to be done first and disking to follow. In case of rain or if the work is stopped for other reasons, the seed may not all be disked in. Another advantage of the new method is that no team and wagon need be used except as they may be needed to get the oats to the seeder for refills.

Farmers are getting away from the old method of check planting corn to save labor. Advantages in drilling corn are that it is easier to pick with a mechanical picker than when planted in hills, and drilled corn can be planted on the contour.

The practice of cultivating corn four and sometimes five times to keep a loose mulch on the surface in an attempt to save moisture, when there are no weeds, is wasted effort on some farms. The Illinois Agricultural Experiment Station reports that "except on heavy soils which check badly, it seems that cultivation ordinarily is necessary only for the control of weed growth."

Studies made by the Division of Farm Management of the University of Illinois based on results from over 2,000 fields show better yields in fields of three cultivations than four or five cultivations.

M. B. Burwash, another Champaign County, Illinois, farmer, by use of deep furrow opener when drilling has saved one cultivation. The field is harrowed with a regular peg-tooth harrow four to five days after planting, then when the corn is four or five inches high it is cultivated with a rotary hoe, covering 60 to 70 acres in a day's time. Only two cultivations are then needed with the four-row corn cultivator. With this combination of operations one man takes care of 200 acres of corn.

The Illinois Agricultural Experiment Station determined nearly 20 years ago that the losses of beans by the binder-thresher method and by other methods in use at that time were in many

cases as much as one-third. These tests played a part in bringing the combines into the Cornbelt. No farmer can afford to harvest beans with a binder and threshing machine if a combine can be obtained.

To get the maximum accomplished with combines that are available, authorities suggest that the period for harvesting crops could be extended by planting early and late varieties of soybeans and small grain. To make this possible, neighbors whose crop is to be harvested with the same combine can co-operate in choosing varieties. Planting one variety at different dates does not have the same effect.

The recognition of the need of eliminating some of the old methods of hay harvesting is evidenced by the fact that the manufacturers of pickup balers are permitted to increase the number being manufactured during the war period. A good many Illinois farmers are now using homemade buck or sweep rakes with good success in getting in the hay crop. Because these homemade rakes are made mostly of wood, more farmers will build them.

While some standards of production may not be maintained quite as high as under conditions when labor is more plentiful, thru use of short cuts the farm need not be neglected. Burley Baker of Piatt County, Illinois, eliminates most of the weed cutting along fence rows with a scythe by using a tractor mower with about four feet of the seven-foot cutter bar, next to the tractor, covered with a metal shield. A strip three feet wide is easily cut without damage to the crop, when small. Many farmers are taking out interior fences entirely, thus adding to the land farmed and having fewer weeds.

The Good Acre

Condensed from Land and Home

Everett G. Reid

VICTORY gardening is an old business with our family. When we began our modest experiment in self-sufficiency on an acre of land back in 1933 it was called "subsistence gardening." At that time money was scarce and commodities overabundant and of low value. According to my carefully kept diary I cheerfully worked a nine-hour day for $1.50 and considered myself lucky when I had work to do. Having earned one fifty I could take it to town and buy:

1 sack of flour	$ .48
10 pounds sugar	.40
1 peck potatoes	.10
3 pounds lard	.18
1 can tomatoes	.08
1 pound butter	.20
1 can pork and beans	.06

It was at that time, when money was scarce, that we made the following resolution: "We will never buy anything that can be made or grown at home." It was our way of making my small and uncertain income stretch to its greatest limit.

It worked, too. While other men were wearing out their shoes tramping from factory to factory seeking nonexistent jobs, I stayed at home and hoed my potatoes, beans and carrots. My wife combined these vegetables with a half pound of salt pork (.04) in a kettle of water and produced a tasty and satisfying meal. We ground a few ears of corn, added a few huckleberries and enjoyed that great delicacy, huckleberry muffins. A creamed mixture of new potatoes, peas and green beans was a dish to relish, even in times of plenty. No one ever left our table hungry even though cash was practically unknown.

Even winter held no fears for us. Our cupboards were loaded with canned goods and our yard broke out in a rash of pits holding potatoes, root vegetables, cabbages, pears and apples. Certainly at that time we did not overemphasize its value when we named our home site "The Good Acre."

Today, ten years later, the picture has completely reversed. Now I earn nearly as much in one hour as I then earned in nine. I have been offered and have refused six jobs in one day. Today it is money that is valueless and

Reprinted by permission from Land and Home, the Official Publication of the National Catholic Rural Life Conference, 3801 Grand Ave., Des Moines, Iowa

commodities that are priceless.

When I can command so much cash for my labor do I still think that it is worth my while to putter around my peas and cabbages? Most certainly, for although money is so easily come by, the markets are bare of products that can be bought with it. Today the $1.50 that was a day's wages ten years ago will buy:

1 sack flour .....$ .95
1 peck potatoes ..... .45
1 pound lard .....

no, that's not wishful thinking. When I CAN buy lard, the grocer only will allow me a half pound, and that costs 18 cents. The days are frequent when there is none at all. Butter and canned tomatoes are as scarce as dollars were in 1933. Canned beans are only a memory, and sugar is doled out on a ration card. If we had to name our little place again today, we would, considering the value of the food it will produce, still call it "The Good Acre."

An acre of land, or as many as one can buy without going too heavily into debt, is the best investment for any family's money. It is of little consequence to the subsistence or Victory gardener whether money is scarce or plentiful. In good times or bad his land is his staunchest support.

Today, as in 1933, the source of our next meal is our smallest worry. Whether it is the bank's vaults or the grocer's shelves that are empty, we know that out in our back yard we have the raw material for many a full plate.

While thousands of families are wondering how they will manage on 33 cans of fruit and vegetables for a year, we check our seed needs in the catalogue against the number of full cans left from last season still on our shelves and plan the number we will need to fill with tomatoes, greens and pickles to carry us through next winter. We know that barring outright catastrophe there will be a great plenty.

Although the government has issued a warning that can covers may be scarce, that is no cause for worry. Drying was in use before canning and many of the dried products are vastly superior to the canned. It is far easier to dry corn than it is to can it and the dried product is much tastier. It has a chewy goodness that the commercial canners try hard to imitate. Dried peas, too, are better. Snap beans, strung on strings and hung in a hot attic, dry into "Leather Britches," much esteemed in the south. In a fruity cake dried apples will replace the raisins that are now becoming so scarce. Much of this drying can be trusted to the sun when the days are as hot as they usually are at the season when this work is in progress.

Then there are the regular dried foods, mostly grains but

some vegetables. We grow our share of them, too. Navy beans, soy beans and field peas all contain protein and fat to help overcome the deficiency of these elements that we are now experiencing because of the meat shortage. Although they are not complete proteins, such as the animal products provide, their good qualities are not to be despised. The U.S.D.A. has a free bulletin telling how to make milk, cheese and butter from vegetable soy beans. It looks like a lot of work and we have never tried it, but we do use soy beans in soup and for baking. Although at first they seem flat to a palate accustomed to navy beans it is worth while to cultivate a taste for them because of their high food value.

"Enriched" flour and bread are the outstanding food contributions to this war period. It sounds very complicated to the layman and no doubt it is. First the miller removes the natural vitamins from the flour. A great laboratory makes a high-priced substitute for them and then the baker pours it back in again. We save all this fuss by leaving them in in the first place. A quarter of an acre will produce enough wheat (rye is also good and easier to grow) to fill our bread needs. We thrash it by grasping the stalk ends and beating the grain heads against the wall. The grain is coarsely ground through a $3.50 hand flour mill which should be a part of the equipment of every subsistence household. A coffee grinder can be used if one is available, and that is about the only use there is for one nowadays. A little white flour is needed to make the yeast sponge, and the bread is best if it is raised once, and then formed into loaves and baked in a slow oven without further raising. We call this "peasant bread." It is brown, sweet, crusty, chewy and DELICIOUS. Of course it doesn't have the air cells that make raised bread light, but then it is not the stomach but the lungs where air is supposed to be stored. Light bread can be made with whole wheat but it lacks the fine flavor of the unraised product. A cereal that eliminates the need for little pink pills is made by cooking one part of ground wheat in two parts of water in a double boiler for a couple of hours in the evening and reheating it to serve for breakfast.

This little mill will also make fine meal from flint corn. It must be ground twice, first coarse and then fine, and screened through a flour sieve to remove the hard husks which make fine seed for small chicks.

Spinach is a stubborn weed to grow so we replace it with rutabaga tops. We prefer them to the southerner's turnip greens because they are smooth and succu-

lent without the rough texture of the turnip tops.

We also use our flour mill in making a coffee substitute. Either wheat or soy beans, when ground and lightly roasted, will make a drink that is fit to wash down the doughnuts of a potentate.

A beverage as good as China ever exported can be brewed from sage leaves. A further inducement to growing this plant is that it is an independent, hardy perennial with tall, lavender, spiked flowers that attract clouds of those airy spirits, the humming birds.

Nuts are another good source of fat and protein. Hazelnuts make a good border hedge and produce one of the easiest nuts to grow and crack. If you have patience, hickory, black walnut or butternut trees will make fine shade and produce abundant food. Sunflowers are in the same class. The Russians have chewed these seeds for generations to get fat that sticks to their ribs. The Germans are using them to make margarine. They also make a fine windbreak around the garden and excellent food for rabbits or chickens.

From an acre of grain and vegetables there are a lot of waste products such as cornstalks, cabbage leaves, lawn clippings and vegetable peelings. These we turn into meat and one of the finest cooking fats by feeding them to a few geese. We have not found it wise to attempt to raise more than six on an acre, and one of these we eat on the fourth of July and a couple more at midsummer birthday parties if the rest are to be kept for the winter holidays without buying feed. They are great weed destroyers.

If our Victory garden is to live up to its name it must be victorious over its enemies. Bugs, disease and slovenly work on the part of the gardener are the major ones. The gardener who plans, plants, sprays and cultivates most efficiently reaps the greatest good from his industry. We countenance no vacant ranks in our plant army. As soon as one rank is demolished we have another ready to take its place.

Yes, its truly Victory gardening. Victory not only over the enemies of our nation but victory over those enemies we meet and contend with daily throughout our lives, in war or peace. Victory over depression and inflation, poverty, hunger and disease. Victory over the food ration book and the man at the employment office who says, "Nothing today."

Selecting the Young Herd Sire

Condensed from Holstein-Friesian World

E. S. Harrison
Cornell University

VOLUMES have been written on how to select a proved sire and attempts have even been made to reduce it to a mathematical procedure. At the same time, the selection of the young untried sire, a far more important and difficult problem, has received little attention. More than 75 per cent of all the dairy cattle in this country have been sired by young unproven bulls. Even in the case of the proved sire he has usually sired as many offspring before his merits as a sire are known as he does after his value has been established. The fact also remains that before there can be a proved sire, a young untried bull must be selected and put into service. Anyone can recognize the merits of a great sire when he has producing daughters, but our real problem is how to select the potentially great sire when he is yet untried.

There is no known basis upon which to select a young untried bull that is infallible. In the first place, there are no perfect animals from which to select. Secondly, there is no such thing as genetic purity in dairy cattle. This fact accounts for the marked differences that sometimes exist between full sisters. Certain families approach a genetic purity much more closely than others. For example, there are families that are known to transmit desirable characters with a high degree of consistency. When an entire family is uniform in both appearance and performance, it means that they possess a high degree of genetic purity for these characters. A bull can be selected from such a family with reasonable assurance that he will prove to be capable of transmitting the characteristics that are common to his entire family. Families that vary widely in both appearance and performance do so because they lack genetic purity. The selection of a bull from such a family, even though the dam is a very outstanding cow is quite a gamble because there is no way of telling whether he will transmit the desirable characters of his dam or the undesirable characters of the poorer members of his family.

The job of selecting a young

Reprinted by permission from the Holstein-Friesian World, Laconia, New York, March 13, 1943

sire is largely one of locating a family that possesses a high degree of genetic purity for desirable characters. There are, however, other factors that should be kept in mind, and I will try to bring them out in discussing what I look for when selecting a future sire.

When we add a sire to our herd we do so with the hopes that he will be able to make a definite contribution towards herd improvement. Before selecting this sire a careful and critical analysis is made of the herd. Common faults or weaknesses in the females he is to be used upon are carefully noted. We then try to find a bull that is not only backed by high productive inheritance, but one that has descended from a family that is particularly strong where the females he will be mated with are weak. Sometimes to get a certain highly desirable character or characters we have risked sacrificing a little in certain other less important characters.

For example, several years ago we added to the herd the cow, Thendara Mary Pledge, a daughter of Winterthur Bess Ormsby. This cow possessed a number of highly desirable characters. She was a consistent four per cent tester from a four per cent dam as well as being capable of high milk production. Her udder was not only shapely and strongly carried, but was very pliable and elastic. She also possessed outstanding feminine refinement, but lacked a little in smoothness of topline.

No Holstein breeder will question the desirability of developing a Holstein cow capable of high milk production and high butterfat test. It is also my opinion that not enough consideration has been given to the importance of udder quality. Udders possessing pliable, elastic quality wear longer, milk out easier and quicker, produce higher and are less subject to trouble than a meaty udder. We felt that if Mary Pledge could contribute these highly desirable characters, we would be justified in running the risk in sacrificing a little in smoothness. She was accordingly mated to Cornell Pride, whose daughters were testing high. He was from Cornell Ollie Pride with a record of 1079 pounds of fat testing over four per cent and she the dam of Cornell Ormsby Esteem, a world's record producer with a four per cent test. Thus, this mating combined two high producing four percent female lines and the bull, Cornell Pride 16th was produced.

His first daughter to complete test has finished a two-year-old record of over 700 pounds of fat with a four per cent test. Her dam's best record made at six years was 503 pounds of fat with

a 3.7 per cent test. Cornell Pride 16th now has ten two-year-old daughters on test, and all but one will exceed 600 pounds of fat and seven of them promise to go over 700 pounds of fat. Their udders are uniformly more shapely than their dams' and they are milking out in from 3½ to 4 minutes with the machine. As a group, these heifers possess outstanding dairy character and quality, but lack a little in smoothness and balance.

The next step in our program is to mate the daughters of Cornell Pride 16th to a son and grandson of Cornell Ollie Catherine. The first daughters of these bulls possess worlds of style, balance and smoothness. I feel confident that these bulls will overcome any lack of smoothness in the daughters of 16th and that the introduction of the Mary Pledge will make a contribution towards improving the butterfat test of the herd that could not have been obtained by exclusive use of Catherine's son and grandson.

In general, our herd has fairly satisfactory udders. There are practically no pendulous udders in the barn and a large percentage of the udders are strongly attached and neatly carried. There is a tendency, however, for them to lack a little in length of fore udder and for the fore and rear teats to be a little too close together. With these faults in mind we began looking for a young bull that should be able to correct them.

When selecting the 150th Earlville Invitational Sale cattle I visited Baker Farms at Exeter, New Hampshire, and had an opportunity to see the Helbon get and their daughters and granddaughters. They are a very uniform group with good production and excellent udders. I was carried away with Expectancy of Baker Farm, a three-year-old daughter of Hope, a member of the 1942 All-American Get. She possesses outstanding dairy character and a marvelous udder. Her teats are perfectly spaced and her fore udder is as good as one will ever hope to find. Expectancy's son, a line-bred Helbon, was purchased at the Earlville Sale for use at Cornell, because he is backed by an inheritance that should make him prepotent for good udders. Later a half interest in this young bull was resold to Baker Farms, and he will have an opportunity to prove his merits as a sire at Cornell and at Baker Farms.

The importance of a high productive level in dairy cattle cannot be questioned. In my opinion, however, a breeding program based solely upon production, cannot succeed. Structural faults, even serious ones, do not necessarily affect production during the first or even the second lactation period. Structural faults,

however, frequently cause an early breakdown and definitely shorten the cow's productive life. Further, when females with type defects are mated to a male that has inherited and is transmitting factors for the same defects, these faults will be exaggerated in the offspring and they may become serious enough to practically destroy their usefulness.

In the selection of our service bulls we are giving more and more attention to the female families that have demonstrated their ability to wear and produce over a long period of time.

An excellent example of such a cow is Cornell Ollie Catherine: 6-yr.-old record, Class A—29,333 lbs., Milk 1,152 lbs., fat. On test again at 13 yrs., in Class B, she has produced in 90 days, 7,881 lbs. milk, 342 lbs. fat, and is still milking 100 pounds per day.

In the past not enough attention has been given to the breeding record of cow families. It is a well known fact, however, that certain cow families are notoriously poor breeders. For example, I know one cow that has made two records over 800 lbs. of fat and has produced four daughters by three different sires that produced 600 pounds of fat as two-year-olds. On the basis of the record of performance of this family it should have been an ideal family to select a sire from, but two of the daughters calved only once, one twice and the other only three times. Thus, on the basis of their breeding record it would have been a great gamble to use a bull from this family.

Everyone prefers their service bull to be a good individual, but show ring type is not a prerequisite of a great sire. A service bull, however, should be free from serious type defects that he would be likely to transmit or which might limit his usefulness. I want a bull with good legs, lots of dairy character and refinement and plenty of constitutional strength and vigor. If he has these things and has descended from an unbroken line of females that possess the type and productive ability I want, I don't care whether he can win in the show ring or not.

Seeding Legumes and Grasses

Condensed from American Agriculturist

George H. Serviss

WITH alfalfa seed at fifty cents a pound, red and alsike clover at thirty cents a pound, Ladino clover at well over a dollar and many grass seeds high, it is going to be easy for Mr. Average Farmer to save enough on his seed bill to buy at least one twenty-five dollar war bond. Some men use too much seed from force of habit; others use too much seed because of inefficient seeding methods. Many have learned a lot of seed will not compensate for poor seeding methods and have changed their practices.

The seeds of hay and pasture plants are small and the smaller the seed the shallower must be the coverage if a living plant is to emerge. Quarter inch coverage is ideal, but there is no practical method of covering all the seed at this depth. It is practical though to get most of the seed mixed in the top half inch of soil. The problem is to conserve sufficient moisture in the top half inch of soil to germinate the seeds and keep the seedlings alive until the roots have time to penetrate to a moist zone of soil. It is better to seed in soil that is too dry for germination to take place than in soil moist enough to induce germination, but too dry to keep the seedlings alive.

One way to insure moisture for seedings is to seed at a time of year when the surface inch of soil is likely to contain sufficient moisture to insure a stand. Early spring and fall are good times to make seedings. The disadvantage of fall seeding is that the legumes are apt to winter kill.

Another means of moisture insurance is by reducing the competition of other plants. Weed competition may be reduced by killing at least one crop of weeds before seeding, by mowing, and by use of nurse (companion) crops. Nurse crop competition may be reduced by pasturing, reducing the rate of sowing or harvesting for hay. While most seedings, for many sound reasons, are made with a nurse crop, it should be borne in mind that the nurse crop is always a dry nurse, never a wet one.

A third means of conserving moisture is by seeding on a firm rather than on a loose, cloddy seedbed. Fall plowing helps, and in addition the freezing and thawing that takes place during the winter has a favorable effect on the physical condition of heavy soils. Except on heavy soils that

Reprinted by permission from the American Agriculturist, Ithaca, N. Y., Feb. 27, 1943

"crust over" the use of a roller or cultipacker is desirable both before and after seeding. On soils that will "crust over" with the first rain, roll before but not after seeding. A light mulch of strawy manure applied after seeding will reduce "crusting" and will conserve moisture, but even a light application of manure will frequently cause oats to lodge, but manure can be used to excellent advantage on summer seedings made without nurse crops and for seedings made on winter wheat.

Most spring seedings are made with a nurse crop. They can be made without one but since grain and straw are needed on livestock farms it is usually better business to make the seeding with one. The problem is: how to get good seedings regularly with a spring-sown small grain? The following practices are recommended:

1. Make the seeding as early as the soil can be worked without damage to its physical condition. This takes advantage of the early spring moisture.

2. See that the seedbed is firm. This means using a roller or cultipacker ahead of seeding. This conserves moisture.

3. Distribute the seed back of the grain drill rather than in front of it, and cover with a roller, cultipacker, spike tooth harrow or plank drag. This insures shallow coverage.

4. Do not sow more than 2 bushels to the acre of oats or barley.

5. In cases where considerable difficulty has been experienced in getting good seedings try this: Cultipack the soil after drilling the spring grain, broadcast the seed on the cultipacked soil and then cultipack again at right angles to the first cultipacking. It means more work but pays dividends.

If these suggestions are followed many farmers can cut their seeding rates 25 per cent, or, in other words, the seed for 3 acres may be used to cover 4 acres. On a seeding mixture made up of 6 pounds of alfalfa, 4 pounds of red clover, 2 pounds of alsike and 6 pounds of timothy, enough seed may be saved on a 15-acre seeding to purchase a $25-war bond. In mixtures where 2 pounds of Ladino clover are being used on each acre in mixture with other legumes, the Ladino seed may be reduced to one pound to the acre. That alone will also save nearly enough on a 15-acre seeding to pay for a war bond.

Working the soil is usually impractical at the time of the year when seedings should be made on winter grain, but that does not mean that seedings cannot be successfully made. Failures resulting from seedings made in winter grain fall into three classes: (1) Those made too late to capitalize on the early spring moisture, (2)

Those made on light sandy or gravelly soils that dry out rapidly and (3) Those resulting from smothering by unusually good yields of grain. These may largely be avoided, even with reduced seeding rates by following these suggestions.

1. Seed before the spring thaw, not afterwards.

2. Put on a light top-dressing of manure before or after seeding on the winter grain. This is especially desirable on the light sandy and gravelly soils.

3. If these suggestions have been previously tried without satisfactory results, delay seeding until after the grain crop is harvested. The land should be disked or harrowed immediately, and then cultipacked if a cultipacker is available, then seeded and cultipacked or rolled again. Many farmers particularly in areas where the season is long enough so that alfalfa may usually be safely cut three times a year have found this a better method than seeding on the grain in the spring.

Many farmers are still seeding 20 pounds of alfalfa to the acre. If 12 pounds to the acre is not enough to produce a stand there is something wrong with the method or the soil is not suitable for clear alfalfa. Reducing the rate of seeding from 20 to 12 pounds to the acre will save enough on a 10-acre seeding to purchase two $25 war bonds. In fact, 8 pounds is enough if soil conditions are suitable for clear alfalfa.

If conditions are not favorable over the entire field for clear alfalfa, seed some timothy and clover with it. One pound of Ladino clover, 6 pounds of timothy and 8 pounds of alfalfa makes a fine mixture for fields having numerous spots where alfalfa winter kills. The same seeding methods are recommended for the mixed seeding as for a clear seeding.

Some farmers feel that a good stand of alfalfa is so important that they can afford to dispense with the nurse crop. This is the surest seeding method of all. The land is plowed in the early spring and then fallowed for several weeks. Weeds are killed by shallow harrowings. Moisture is stored in the soil in the absence of crops or weeds to remove it. Here is where the cultipacker method, previously described, works to perfection and should be used if possible. Alfalfa is usually sown in the early summer by this method and it is seldom that weeds become a serious factor.

This method is also fine for pasture seedings if they are made early enough, but they should be made in time for the seedings to become well established before the hottest part of the summer. Weeds in pasture seedings can be controlled more effectively by

mowing, without injury, than is the case with weeds in alfalfa seedings so it is not quite so necessary to eliminate the weeds before seeding.

In buying seed this spring remember that bargain seed is frequently the most expensive seed. Carefully examine all tags for guarantees as to germination and purity before accepting delivery. If you have been obtaining good stands consistently with light rates of seeding—stick to your present method. There is no one method that is always best.

Timed Milking Saves Labor

Condensed from Electricity on the Farm

TIMING the milking machine at six minutes per cow or less and then removing the machine, will cut the milking time approximately in half and have other beneficial effects according to reports from the Geneva (N. Y.) Experiment Station. With the shortage of labor, the increasing demand for milk and the pasture and busy season coming on together, no dairyman should fail to study these findings.

The Geneva Station has been studying machine milking since 1912. Several reports have been issued, the latest one being Bulletin No. 697 issued in 1941.

The time of milking at the Geneva Station has been reduced from 11.7 minutes to 6 minutes per cow, including time to put on and remove the machine. In order to be sure, a reminder bell rings six minutes after the machine is removed from the previous cow. The machine is taken off immediately and the milking finished by stripping. Old cows gave a quart of strippings at first; in three weeks it was a pint. Then, out of the herd of 30 milking head there were only three cows that required any hand stripping. The others milk out completely by machine in six minutes; some in less time. Under this arrangement one man with two single units milks five cows in 15 minutes. It keeps him moving.

Some additional observations are of interest. Heifers milk out readily in 4 to 5 minutes. Old cows adjust slowly to faster milking, but they can be trained. Hard milking cows have become more easily milked. Milk production has held up better under this system of fast milking and the incidence of mastitis in the herd has been less than ever before.

More rapid machine milking means time saved and more milk produced per man. Each dairyman will have to work out the system for his own herd. This is a good time to do it.

What Is Cheap Land?

Condensed from The Nation's Agriculture

True D. Morse

Doane Agricultural Service

PRODUCTIVE farm land in the Corn Belt is again selling readily in a range of $100.00 to $200.00 per acre with some sales being made at $300 per acre or more. There is developing increasing price resistance against paying such high prices per acre. Buyers always want to buy bargains—cheap land in relation to its true value. Cheap land when thus defined may be $200.00 per acre or $15.00 per acre depending upon the adapted use.

What is cheap land? When is land a bargain?

These are questions important not only to buyers but to those who own land. The class of land that is too high-priced to buy may be too high priced to continue to own. Often the best advice you can give a farm owner is to sell the land he has and then buy a better farm. The same facts that indicate what a buyer should purchase also show the kind of land a person can most profitably continue to own.

It is not always easy to convince a man with $32,000.00 to invest in farm land, that he should buy:

> 160 acres at $200.00 per acre instead of 1600 acres at $20.00 per acre.

Neither is it always easy to convince a farmer that he should:

> sell his 800 acres at $25.00 per acre and buy 200 acres at $100.00 per acre;

but these figures illustrate practrical problems that come to farm managers and land appraisers almost daily.

When a person has spent hours patiently explaining to a farmer or business man why a farm priced to him at $150.00 per acre may be much cheaper than six times the acreage priced at $25.00 per acre and then sees the man go out and buy the big acreage at the low per acre figure he knows what price resistance is. He also is confronted with one of the reasons why land at a low price per acre is often so high in price relation to its true value. Because it appears cheap, it often sells high.

Even experienced appraisers

Reprinted by permission from The Nation's Agriculture, March, 1943

and loan men in the past have made similar mistakes. "Poor land is usually appraised too high and good land is valued too low." "Too much is loaned on poor land." There are much statistical data to support such statements. Witness records such as the following that have brought loss to loan companies and bankruptcy and foreclosure to farm owners by the thousands:

Soil Productivity	Appraised Value of Land Per Acre	% of Loans Foreclosed	Net Loss Per $1000 Loaned
Good	$207	8	$ 16.10
Intermediate	117	12	45.99
Inferior	83	21	106.29

"Losses to lenders are likely to be heavier on poor soils than on good soils." (Bulletin 468, University of Ill., Agricultural Experiment Station.)

More debts are paid on farms with good soils even though the debt per acre is much higher. Some studies show as much as 5 to 10 times better records in favor of good soils.

The disastrous 15 years following 1920 that wrote such records as the foregoing should have taught a lesson that this generation would never forget. But there is plenty of evidence that many farmers and other farm buyers still do not know what land is cheap and which farms are high priced.

Iowa State College has received the following informative averages on land value trends from real estate dealers in Iowa:

	Nov., 1941	Nov., 1942	Percent Increase
Excellent Land	$120	$134	11
Good Land	90	101	12
Fair to Poor Land	55	64	14
Average	$ 88	$100	11

History is repeating itself. Fair to poor land is increasing most rapidly in price. Too much probably is again being paid for poor land in proportion to earning value.

Perhaps most buyers are not statistically minded enough to realize that when

$100.00 land moves up $25.00 per acre in price it is the same percentage increase as,

$10.00 land moving up $2.50 per acre.

Right now central Iowa buyers are balking at paying $150 per acre for land priced a few years ago at $100, but they go into areas of poorer land and think they are buying a bargain when they pay $50.00 per acre for farms that a few years ago were going begging at $25.00 per acre.

What do farm management records show is cheap land?

In Illinois for 1940 Farm Business Reports on 2,738 of the better managed farms show returns on the total capital investments

declined with average per acre values as shown in the table.

It is probable that this record can be duplicated in any state and in any type-of-farming area. Whether producing corn, cotton, wheat, sugar beets, tobacco or cattle or sheep on range land this rule invariably holds true—high yields per acre are associated with prosperity. Land that is most productive — whether the product be corn, cotton, wheat, pasture, or range—usually makes the highest average return on the investment and pays the most to the operator for management and labor.

Unusually capable men may make equally good returns on less productive land but the average do not succeed as well. When this same unusual management ability is applied to land of better quality much greater returns are usually produced.

Obviously in comparing the productivity and price of various tracts of land the comparisons must be kept within similar use groups. Corn Belt farms must be compared with other farms best adapted to the growing of Corn Belt crops. Sheep ranches should be compared with other ranches adapted to sheep grazing. Thus $150.00 Corn Belt land may within the Corn Belt be equal to $15 per acre sheep ranches. Therefore, these statements must not be inferred as condemning land selling at a small price per acre. If it represents the better lands within the class it may be the most profitable in relation to its price and hence the truly "cheap land."

It is rather drastic treatment for a farmer or farm owner to actually sell a farm and buy another because of price relationships but there are many cases in which this should be done. Successful farmers can well consider selling their low producing farms and buying better lands

Area	Value of Land and Improvements per acre	Total Investment per acre	Net Income per acre	Return on Total Investment per acre
4	$133	$169	$9.02	5.3
2	120	163	8.71	5.3
3	116	155	8.01	5.2
1	113	163	8.66	5.3
5	84	112	4.68	4.2
6	62	88	4.34	4.9
8	55	74	3.11	4.2
7	39	57	1.81	3.1
9	35	50	.35	.7

when there is an active market for low priced land. This is "buying up the ladder" much the same as the capable hired man progressing to a tenant and later becoming a land owner. A word of caution — in uncertain times like these such a change should not be made if excessive debts will result.

Prices of farm lands are going up. They will continue to rise as long as the prices of farm products go up. Prices of farm products will continue to go up for the duration of the war, and many economists anticipate that they will continue to rise or stay at a high level for one to two years after the war ends. Others fear a break in prices as soon as the war stops.

For 1941 the increase in farm real estate prices was the largest in 30 years, except for the 4-year advance stimulated by World War I. Every state reported increases of one to fifteen points, with a 7 percent average rise for the United States as a whole. Such data as is already available for 1942 shows that land price increases are continuing.

Foreclosed and other liquidation lands are rapidly disappearing from the market. Voluntary sales have increased rapidly to the largest number per 1000 farms since 1920.

Local land booms have been in progress for the last two or three years and the stage is all set for a further rise in land prices. Another general land boom of major proportions may be in the making.

It is under such conditions that land of low value becomes disproportionately high. With a less active market such land is slower to sell and under closer study in its true value is more apt to be recognized.

Those who will most effectively weather the difficult years following the war will not be those who have loaded up with "cheap land." The margins of income above taxes and other fixed charges can rapidly disappear when prices drop. Those who have purchased at a fair price, good land well adapted to the use being made of it, should have a continuously favorable experience.

"I had seen the security based upon banks, stocks, bonds and industry, waver, disintegrate and vanish. In the 25 years spent in half the countries of the earth, I had seen only one form of security which survived everything. That was the security which comes of the land, of owning good, productive earth."—*Louis Bromfield.*

Land is probably the safest of all investments but—*beware of the lure of "cheap land"—it often is very high priced.*

The Fertilization of Pastures

Condensed from Better Crops with Plant Food

S. D. Gray

Washington, D. C.

PASTURES constitute the greatest undeveloped resource in American agriculture. They have had a profound influence on the livestock industry, the margin of profit in most phases of this industry being dependent upon the extent to which good pasture is utilized. Fertilization of good pasture to keep it good or of below average pasture to restore it to a satisfactory level of production is a wise investment on any soil suited to the growing of grass and clover.

While pasture use has contributed much to the success of livestock farming by supplying a cheap and highly nutritious feed, it has been largely at the expense of the virgin fertility of the soil. Continuous removal of the mineral plant-food elements, lime, phosphorus, and potash, in the meat, milk, and wool sold off the farm without replacement by fertilization has reduced yields and increased cost for barn feeding to a point which seriously lessens economic production.

The carrying capacity of many of our pasture lands is ridiculously low. A study of the statistics on this subject reveals that on the arid and semi-arid ranges from 25 to 100 acres of land are required to support one full-grown cow or steer. In the humid regions where moisture is not a factor and where the soil fertility is still such as to support a fair growth of herbage, about five acres are required to support one animal unit. An examination of records on carrying capacity of pastures in important European countries shows that the number of acres required to carry one animal unit ranges from .91 in Belgium to 2.65 in Great Britain and Ireland. Corresponding figures from Germany, Denmark, and the Netherlands are 1.24, 1.46, and 1.60 respectively.

European farmers are far ahead of American farmers in the management and care of pasture lands, economic conditions and scarcity of lands for grazing having compelled them to employ a system of intensive fertilization and rotational grazing. The basic fertilizer treatment usually employed involves the use of lime

Reprinted by permission from Better Crops With Plant Food, Washington, D. C., June-July, 1942

every five to six years, annual applications of phosphoric acid and potash in amounts to supply approximately 50 pounds of each, and successive doses of nitrogen applied in three or four different applications, supplying a total of approximately 100 pounds of nitrogen per acre per year. While this system has been highly satisfactory under American conditions wherever land values have been high or limited in acreage, the time has not yet come for its extensive use.

Pastures in the humid regions of the United States have gone through several distinct stages of impoverishment, each followed by lower production of forage of inferior quality. Depletion of the supply of lime and phosphorus is usually the first stage encountered and is usually reflected in a less vigorous growth of the grasses and legumes. This is followed by the exhaustion of potash, disappearance of legumes, and the appearance of inferior species of grasses, weeds, moss, and finally brush. In the first stages of soil fertility exhaustion, the use of phosphorus alone or with lime is likely to be sufficient to bring back the clover and through its growth help maintain the nitrogen supply. Most of our permanent pastures in the humid area probably passed the first stage of fertility exhaustion more than a generation ago. They are now, therefore, about equally deficient with respect to potash, organic matter, and nitrogen.

Results of fertilizer experiments on pastures have been on the whole impressive and clear cut. Quite generally they have emphasized the importance of liberal fertilization. While authorities are agreed that phosphoric acid is almost universally deficient and consequently the basis of any successful treatment, repeated tests have shown that it is not always a sufficient treatment. Evidence is accumulating from experimental work in widely separated areas showing that potash is frequently as necessary as phosphoric acid particularly in areas where emphasis is placed on the need for legumes in the pasture. These data have also stressed the relationships of lime to efficient utilization of phosphorus and potash.

Typical of the research findings with respect to pasture fertilization are recommendations recently emanating from the New Jersey Agricultural Experiment Station from which we quote: "On farms with limited acreage a greater net gain to the farm might be obtained from the more intensive system of fertilizer treatment. On farms with more adequate acreage, however, the treatment with lime, phosphorus, and potash which brings in clover would be the most profitable.

Perhaps the best system on many farms would be the use of heavy nitrogen fertilization balanced with lime, phosphorus, and potash on a part of the pasture for early spring grazing and the use of the straight mineral treatment, lime, phosphorus, and potash, to stimulate clover on the remainder of the farm."

A shortage of either phosphorus or potash, or both, is often a primary cause of poor clover growth, according to the Pasture Production Manual published by Mississippi State College, and where they are lacking as indicated by present or previous crops, these minerals should be applied before reseeding old pastures or seeding new ones on depleted soil. Muriate of potash should be applied at the rate of 100 pounds per acre, and superphosphate at 200 to 400 pounds per acre, or 500 to 1,000 pounds of basic slag per acre, the manual suggests.

While the recommendations of the different experiment stations vary with respect to the fertilization of pastures, they are, generally speaking, in very close agreement on the matter of major objectives and practical management practices. Supplementing the excellent experimental programs in the several states where pastures are important are the extension demonstration programs taking the results of research direct to the farms of the Nation.

Pasture improvement demonstrations conducted in 45 counties in Indiana during 1939 developed some very interesting facts. From 26 of the demonstrations on which records were secured, results show that permanent pasture definitely responded to plant-food treatment. Phosphoric acid increased the average yield only 36%, phosphorus plus manure increased the yield 48%, phosphorus plus potash 47%, and complete fertilizer 69%. In all demonstrations lime was added where needed.

Results of 34 pasture experiments in Ohio during 1933 calculated on the basis of equivalent production per acre in pounds of beef and milk gave for the O, P, and NPK treatments respectively, 111, 203, and 389 pounds for beef and 1,080, 1,983, and 3,789 pounds for milk. In terms of cost of pasture per 100 pounds of beef and milk, the figures for the same treatments were $4.05, $2.96, and $2.71 for beef and $0.42, $0.30, and $0.28 respectively for milk. Whether calculated as per acre production or cost of pasture per 100 pounds of beef or milk, the economic returns were significantly favorable for each fertilizer treatment.

Pasture top-dressing tests on 103 farms in 15 states and the Province of Ontario were report-

ed by the National Fertilizer Association in 1930. Average results expressed in terms of dry matter and pounds of protein per acre present one of the most convincing pictures for fertilization that has been made available. Yields from the O, P, LP, LPK, and LNPK treatments were 1,051, 1,392, 1,548, 1,850 and 2,501 pounds dry matter per acre. For the same plots the yields of crude protein per acre were 171, 235, 266, 344, and 488 pounds. On 50 of these farms where accurate records were kept, an average application of fertilizer costing $15.14 per acre returned an average net profit of $29.62, or in other words, 195% on the investment in six months. Decreased feed costs and increased milk production practically paid for the cost of the fertilizer before the unfertilized pasture was ready to graze. In the opinion of those who conducted these tests, the use of high analysis fertilizer offers the dairy farmer quicker returns than any other investment he can make.

Pastures are recognized as being the best and cheapest source of protein feed. In the young, tender stage pasture grasses contain more protein than alfalfa hay, about twice as much as mixed clover hay. Cost of this protein is about one-third as much as in purchased feed. It is quite clear from the experimental work that has been reported that both the yield of dry matter as well as the protein are greatly increased by proper fertilization.

It is well known that apart from bulk the feeding value of pastures varies in different areas. It has been shown in recent investigations, reported by Dr. J. B. Orr of Aberdeen in his book, "Minerals in Pastures," that one of the most important factors in determining the feeding value is the amount of calcium, phosphorus, sodium, potassium, and chlorine present in the herbage. Some pastures may be so poor in one or the other of these elements as to be the cause of disease among grazing animals. Rickets in young animals, general unthriftiness and low producing capacity in mature animals are characteristics of mineral deficiencies most frequently observed. In considering the mineral content of a pasture in relation to its nutritive value, it is necessary to have some standard of the requirements of animals for the different minerals. In the present state of our knowledge, according to Orr, the amount of minerals found in milk affords the best available standard for growing and lactating farm animals. The following table compares the amounts of the important minerals found in the quantities of cow's milk and good pasture which yield 1,000 calories.

Comparison of Mineral Content of Good Pasture with That of Milk
(1,000 calories contain the following amounts in grams)

	Na_2O	CaO	P_2O_5	K_2O	Cl	Nitrogen
Cow's Milk	0.81	2.38	3.43	3.21	1.4	8.32
Good Pasture	0.94	3.64	2.75	11.54	3.5	10.40

It will be seen that there is a fairly close resemblance between the mineral content of good pasture and that of cow's milk. There is no natural foodstuff so well balanced in this respect as good pasture. The close correspondence of the mineral content of a good pasture to the mineral requirements of the animals is doubtless one of the most important factors in the well-known high nutritive value of pasture for promoting growth and maintaining health of animals grazing thereon.

The mineral composition of different species of plants varies quite widely. The most outstanding difference is that between legumes and grasses. Legumes as a group tend to be richer than grasses in all of the minerals, especially in calcium. Grasses, however, are relatively richer in phosphorus than legumes. It is well-known that addition of clovers or other legumes to grasses increases the value of the grazing. This is probably due in some extent to the fact that the two together in the proper proportions make a well-balanced diet.

White clover is sometimes styled as the key to pasture improvement. By many authorities it is regarded as an excellent indicator of mineral deficiencies. When it fails, it is a reasonably sure sign that the supply of potash, phosphorus, and/or lime is deficient.

The old axiom, "take care of the legumes and the grasses will take care of themselves," is being put into practice throughout the humid areas of the United States. The big problem in this connection is quite naturally that of supplying the necessary minerals, lime, phosphorus, and potash, before planting the legume. The second most important probably is that of selecting the legume best suited to the particular soil and climatic conditions. White clover, the premier legume for growth in association with grasses, does best under cool, moist growing conditions.

In the Northeastern States ladino clover, a giant type of white clover, is receiving a great deal of attention. It is a triple-purpose crop-valuable for hay, pasture, or silage. It is distinguished from ordinary white

clover by having much larger leaflets and taller stems. Owing to its more erect growth, it is able to compete with tall growing grasses and legumes. Although not so well adapted to closely grazed pasture sods as the smaller types of white clover, under favorable management and liberal mineral fertilization, ladino is permanent and produces large yields of high quality feed.

In areas that are subject to drought, such as in our Midwestern States, white clover has been largely replaced by the deeper rooted legumes, alfalfa and sweet clover. In the South and Gulf Coast States, a number of shallow rooted legumes have been tried out. Among the best for use in pasture mixtures have been the white Dutch and Persian clovers for wet soils and on the well-drained soils species such as the California burr, sweet clover, black medic, little hop, and Lespedeza. Of one thing we are quite sure and that is for almost every condition or section of the country where pastures need to be grown, there is a legume well suited for pasture uses.

No discussion of pastures would be complete without some mention of the part they play in soil conservation. As a means of protecting soil against erosion, pasture is universally recognized as the best form of land occupation except woodland. Its value for this purpose has received Nation-wide emphasis under the several programs of the Soil Conservation Service and Agricultural Adjustment Administration. Large tonnages of lime and commercial fertilizers have been used in establishing permanent pasture sods, the basis of soil conservation in many areas.

There is probably no other means of so greatly reducing the cost of production of livestock and livestock products and so greatly increasing the net farm income as through the improvement of farm pastures.

They Like Lespedeza

Condensed from Farm Journal and Farmer's Wife

LESPEDEZA is not a new crop, but it is making so many converts each year that new and better adjectives are needed to write about it.

Missouri farmers can supply the needed adjectives. Introduced into Missouri only a few years ago to help stop erosion, the crop has turned out to be the answer to a whole handful of problems in these days of labor scarcity. The crop will grow on 95% of all farms in the state.

Lespedeza has made possible a "one-year rotation." You can sow wheat in the fall and disk lespedeza on top of it in the spring. You can harvest the wheat and then in July, just as bluegrass pasture begins to peter out, you can turn cattle into the lespedeza. The lespedeza seeds itself in fall, you disk in more small grain, put on commercial fertilizer at the rate of 150 pounds per acre, and you're all set for another year.

This sort of farming keeps the ground covered the year around, and that has brought soil washing under control. "We've got erosion down to where it doesn't scare you to ride through the country," says W. C. Etheridge, head of the field crops department at the University of Missouri.

Lespedeza builds fertility. Being a legume, it puts nitrogen in the ground. And it is the one type of southern corn-belt farming which will make an annual application of commercial fertilizer pay out.

It has rejuvenated bluegrass pastures all over the state by giving them a late summer rest. Unfortunately, it is not a reliable crop much north of Missouri.

Lespedeza saves labor. Missouri's corn acreage has declined about 40% in recent years, thanks to lespedeza. No cultivation is needed, and very little plowing, in a lespedeza-small grain system. At the University of Missouri there is a field that hasn't been plowed since 1934, and it is still going strong.

Finally, Missourians are finding that they don't need corn to fatten beef, provided they have two-year-old steers. Baby beef needs corn, but, says E. A. Trowbridge, head of the University's animal husbandry department, "two-year-olds on lespedeza will really go to town." Last fall the University sold a bunch of steers finished on lespedeza, with no corn, for $14.75. Some others from the same lot, fed out on corn, sold the same day for $14.50.

Reprinted by permission from the Farm Journal and Farmer's Wife, Philadelphia, Penna., April, 1943

Hog-Lot Strategy

Condensed from Kansas Farmer

Roy Freeland

NEW food goals suggest that one of this war's toughest battles will be fought in American hog lots.

Due to the critical labor shortage, any increase in pork production must result primarily from improved hog-lot strategy, serving as a substitute for needed manpower.

Full possibilities of shrewd hog-lot strategy are demonstrated by John Otte, of Jewell county, Kansas, who has a habit of raising about 9 pigs to the litter. While boosting the nation's wartime pork supply, such litter averages would cut production costs and insure higher profits for the farmer.

There's no miracle about John Otte's hog raising. There isn't even an expensive layout of hog equipment. But there is plenty of careful thinking and planning, in a system which could be followed on virtually any farm. He can tell how he does it too, for Mr. Otte has an accurate set of books showing everything that has been bought, sold or fed for several years.

Mr. Otte first attracted statewide attention 2 years ago when he won first place in the Kansas Pork Production Contest. That year his 10 sows raised 90 pigs to market age. On a previous year, the same 10 sows had raised 93 pigs to market age.

He doesn't single out any one reason for this success. He has a lot of reasons and they all are good. The first thing Mr. Otte mentions is sanitation. He keeps his hogs free of disease without following too many inconvenient steps.

Mr. Otte has made his enviable record while raising hogs on the same ground, year after year. The secret of this lies in the fact he plows the lots and pastures at least once a year, thereby reducing danger from necro, worms and other diseases and parasites.

Along with this regular plowing, Mr. Otte seeds the lots to good pasture crops, so his hogs are provided with grass nearly every month in the year. Oats is the favorite grass in spring, Sudan serves during hot summer months, and rye provides grazing from fall to spring. Mr. Otte considers pasture one of the

Reprinted by permission from the Kansas Farmer, Topeka, Kansas, Dec. 19, 1942

first considerations in producing thrifty pigs.

All places that could harbor disease are quickly eliminated. Buildings and equipment are scrubbed with boiling lye water twice each year. When wallows become stagnant they are filled with dirt or sand. In hot weather, Mr. Otte's hogs enjoy a home-made wallow which features a shaded concrete basin filled with water. This basin was built under an old building, and water is pumped in by a windmill.

Even more important than a wallow, Mr. Otte says, is the job of providing fresh drinking water. He is convinced that fresh water is an important factor in producing big litters and high gains, so an automatic waterer is part of his regular equipment.

This device is equipped with a lamp to keep water reasonably warm in winter, and is constructed so the hogs cannot slop water out and start a wallow in summer. During the gestation period, both water and feed are provided at a point 50 or 100 yards from the hog house. This forces sows to take the exercise they need.

In selecting his breeding stock, Mr. Otte looks for feeding quality and a good disposition. Only purebreds are used for herd sires, and the sows are obtained by saving choice gilts from each crop of pigs. Disposition, he says, is an important factor in influencing the average number of pigs raised.

His high litter averages have always come from sows that were quiet and gentle. One year after raising 2 or 3 successive crops averaging 9 or more pigs to the litter, Mr. Otte bought a new herd boar which proved to have a wild, disagreeable disposition.

Gilts from this boar were saved for brood sows, and they farrowed litters the next year. Like their sire, these sows were nervous and cranky. When Mr. Otte entered the hog house they would jump up and often would step on a pig. Many pigs were mashed that year, and as a result the record dropped to 7 pigs to the litter. As these sows were disposed of and the herd boar was replaced by one more quiet and gentle, succeeding pig crops scored higher litter averages.

There are no furloughs for brood sows in Mr. Otte's regiment of pork producers. Every sow raises 2 litters a year, so she pays well for her feed and housing. Litter averages are boosted by guard rails in the farrowing quarters, and by constant attention at time of farrowing.

In feeding, as well as in general management, Mr. Otte follows a careful plan which helps produce more pounds of pork from each litter. When pigs are big enough to start eating, they

receive ground grain in a self-feeder, and then continue eating from self-feeders until they go to market.

As a fundamental principle in hog feeding, Mr. Otte firmly recommends a wide variety of grains and a variety of protein supplements. The most common grains used for brood sows on this farm are barley and oats, fed along with lighter amounts of corn, wheat or sorghum grain.

Last year, during the gestation period his 10 sows ate 81 bushels of oats, 66 bushels of barley, 19 bushels of wheat and 17½ bushels of sorgo. After farrowing, the use of barley and corn was increased. During the suckling period the 10 sows ate 177 bushels of corn, 102 bushels of barley, 39 bushels of wheat, 65 bushels of oats and had 45 days of rye pasture.

At the same time, pigs running to self-feeders in a creep ate 26 bushels of barley, 26 bushels of wheat, 27 bushels of corn, 800 bushels of soybean meal and 800 pounds of tankage, along with a mineral mix of bonemeal, limestone and salt, mixed equal parts. This supplement was always available, free choice.

During the fattening period, the 90 pigs ate 652 bushels of corn, 340 bushels of barley and 1,300 pounds of tankage, along with the mineral mixture. The pigs averaged 49.3 pounds at weaning time, and 222 pounds when they went to market at slightly more than 6 months old.

Taking a general look at this crop of pigs you will notice that each of the 10 sows ate 778 pounds, or about 15.5 bushels of grain during the gestation period. With the average of 9 pigs to the sow, this was at a cost of 86.4 pounds of feed for each pig raised.

Economy of the big litters is seen by comparing these litters with average litters thruout the country. The national average is only slightly more than 6 pigs. If Mr. Otte's sows had produced at this rate, amount of feed required for each pig during the gestation period would have been 129.7 pounds. Therefore, in comparison with average cost of pigs, Mr. Otte got 3 pigs free in each of his litters.

During the 10-week suckling period, each sow ate 1,922.8 pounds of grain, or about 38 bushels. This was in addition to the protein supplement, some milk, and 45 days on grass. During the same period, each pig ate 48 pounds of grain and 17.7 pounds of protein supplement in the creep.

From the time the 10 sows were bred until their 90 pigs were weaned, about 352 pounds of feed was required to produce each pig. The average feed cost for each pig was $4.06. From weaning

time to market, each pig ate 476 pounds of grain and 15 pounds of supplement, to put on 172 pounds of gain.

Only 280 bushels of grain and 9 pounds of supplement were required for each 100 pounds of gain. This is in addition to Sudan pasture and the mineral mixture of bonemeal, limestone and salt. Total return from the 10 litters was considerably more than double the feed cost.

At present, Mr. Otte says, there are 2 good reasons for using mixed protein supplements. In the first place, experiments show that a mixture of animal and vegetable proteins is superior to either type alone. In the second place, a mixed feed can be supplied much cheaper than tankage.

His books show that in September, this year, he paid $4.20 a hundred for tankage, $2.65 for soybean meal, $2.60 for linseed oilmeal, $2.50 for cottonseed cake and $1.80 for alfalfa meal. The 5 feeds mixed together gave a feed much less expensive than tankage. Yet it probably had a higher feeding value than straight tankage.

As these protein feeds are purchased at the store they are dumped in Mr. Otte's truck in proper proportions. They are mixed together with a scoop shovel and are then trucked home and scooped directly into feeders, where the mixed supplement is fed free choice.

This year, Mr. Otte's spring pigs were fattened entirely without corn, the ration consisting of milo, rye and protein supplement. The first 100 head sold at an average weight of 226 pounds, giving a net market return of more than $32 a head.

Domestic Rabbits for Home Consumption

Condensed from The Western Farm Life

Dr. George S. Templeton

Director, U. S. Rabbit Experiment Station, Fontana, Cal.

DOMESTIC rabbits lend themselves nicely to the war program and will make a dual purpose contribution by furnishing meat and pelts, both of which are important. They require only a small space and may be raised on farms, in the backyards in town, or on a small city lot. Hutches may be constructed of lumber and chicken mesh wire, materials that are readily available. In a great many cases, scrap lumber, crate material, etc., can be secured for a small outlay and the investment in this equipment would be small.

Rabbits consume a variety of feeds and for the small backyard unit maintained for producing meat for home consumption, waste from the kitchen and garden, lawn clippings, palatable weeds, and similar materials may all be utilized to supplement the grain-protein-hay ration and produce meat at a low cost. And it is an economical meat to produce—only 2.5 pounds of grain-protein mixture, 1.5 pounds of hay, and one-half pound of green feed are required to grow one pound of fryer, counting all feed from the time the doe is mated until the fryer rabbits are ready for the table or for the market. It is a quick meat to produce, too, for only 90 days are required from the time of mating the doe until the young rabbits are ready for market.

Three or four does and a buck will furnish the average family with the fryer rabbits they will consume, then additional does may be added from time to time if the breeder wishes to expand his meat production program to supply neighbors. Heavier rabbits may be added to the program for those who enjoy fricasseed rabbit, roast rabbit, etc. Every pound of rabbit meat that can be produced now will save 1 pound of some other variety of meat that can be released for feeding our armed forces or for exporting to our Allies.

But this is only part of the story, for the pelts serve a wartime need, too. All of them should be saved and be given proper care. The fur and felting industries need these raw materials to

Reprinted by permission from Western Farm Life, Denver, Colorado, March 1, 1943

carry on their important part in the war program. The choice pelts are used for making fur garments and as fur lining or trim for other garments. The fur from the poorer quality pelts is used for making felts.

Thousands of families could well keep three or four does and a buck for supplementing the family meat supply at this time. Experienced breeders who have a dependable market for their meat and pelts should produce up to the capacity of their equipment and some of these breeders may profitably increase their equipment and production. The novice, however, should not be encouraged to go into the meat producing business on a large scale but to start on a family meat basis. He can then increase production gradually as experience and outlet for the product dictate.

The United States Department of the Interior maintains an experiment station at Fontana, California, for working out rabbit production problems for all of the states. Breeders interested in this home-food production program may obtain literature to assist them in building equipment for their rabbitries and in the proper methods for managing and feeding the animals by making request to the United States Department of Interior in Washington, D. C., or the United States Rabbit Experiment Station at Fontana, California.

Swine Erysipelas a Menace to Production

Condensed from Hog Breeder

Dr. W. T. Spencer

EXPERTS in the food industdustry calculate that the States will have to furnish food for 200,000,000 people outside of our own population. The lowly American hog will be called upon to supply much of this huge order. There must necessarily be a tremendous increase in swine production in the United States. With rapid increase in numbers produced, there will be a lack of facilities for proper handling on many farms. A great many who lack experience in the problems of swine production will attempt to grow swine. These factors will multiply ever-present disease hazards and require constant vigilance by owners if their herds are to be protected from unnecessary disease losses. Many complications are involved in dealing with infectious diseases.

Swine erysipelas will take a heavy toll under the increased production program unless intelligent effort is directed toward its control. This infection has been present for a long time in the United States but has been inactive and causing no serious trouble until recent years.

In 1930 and 1931, a disease resembling hog cholera, but which did not respond to recognized methods of control for cholera, appeared among scattered herds of hogs in Nebraska and South Dakota. The trouble in these herds was diagnosed as swine erysipelas. The field diagnosis was confirmed by laboratory tests conducted by state and commercial laboratories.

During the drouth years of 1934 and 1936, the extensive traffic in feeder pigs apparently spread the infection widely.

While the disease has gained a foothold and is a problem of major importance, the percentage of farms involved is still relatively small. Therefore, every precaution should be exercised to prevent general distribution of the infection.

Nebraska pioneered in an experimental program, under the direction of Dr. L. Van Es of the Nebraska College of Agriculture, to determine the feasibility of serum-culture inoculation in the prevention of swine erysipelas. Results have been most satisfactory. The Nebraska plan has been extended by the U. S. Bureau of Animal Industry to

Reprinted by permission from the Hog Breeder, Chicago, Ill., January, 1943

include Iowa, South Dakota, and other states.

Swine erysipelas is treacherous. It often creeps into herds and remains for months before it is recognized. It is contracted through contaminated feed, water and infected soil. The germs of the infected animal are discharged through body excretions. The disease occurs in either acute or chronic form.

In the acute form, one or more hogs found dead may be the first indication of trouble. Others quickly sicken and are apt to be found away from the herd. Soreness of the legs with lameness, arched back and swelling of the joints are frequently present. Reddening of the skin with peculiar diamond-shaped spots is sometimes seen. High fever, ranging from 107 to 110 degrees is found in sick animals in the very early stages of development. The temperatures usually drop to 104 or 105 degrees in 24 to 48 hours.

Frequently, it is difficult to tell the difference between acute swine erysipelas and hog cholera. The symptoms are very much alike in many herds and so are the findings after death. Inflammation of the body linings, congestion of the lungs, liver and spleen with small hemorrhages of the membranes of the heart, kidney, and bladder are present. The stomach is congested, the spleen moderately enlarged is bright red in color. In uncomplicated hog cholera, there is little or no change in the size, color or consistency of the spleen. Sudden deaths are not so common in hog cholera as in swine erysipelas.

The history of the infected herd should assist in determining whether it is swine erysipelas or cholera. The record indicating whether the herd has been immunized against cholera and the time of the year in which the disease occurs are important factors. High fever usually continues for several days in hogs affected with cholera but usually drops in 24 to 48 hours in swine erysipelas. Swine erysipelas is more prevalent in the summer months than during the winter months and it is much more apt to attack young suckling pigs than is cholera. The acute form is often encountered and if the herd is not properly treated, many will become stunted in growth, develop big joints and the disease will become chronic.

There are a great many cases on record that indicate a chronic type of infection having lingered in herds for months, and occasionally for one or two years before deaths from the disease occurred. These cases are especially dangerous. Owners do not usually recognize the danger and diseased animals are permitted to remain in the herd or may

even be sold to go into clean herds where they continue to spread infection.

In the chronic type, affected animals become unthrifty and fail to do well. There may be sloughing of the ears and tails. The most common symptom is enlargement of the joints.

Since 1928, evidence of this form of the disease shows an increase of almost three times in the number of animals affected. There were 6,991 carcasses retained by government inspectors on account of arthritis in Omaha packing houses from Jan. 1 to June 30, 1942. Approximately, 1,000 of these carcasses were entirely condemned.

Prevention and Control

Every hog raiser should know how to prevent this disease and take the necessary measures to protect his herd from infection. Once the infection of swine erysipelas is brought onto the farm, it remains a source of danger for years. There is no practical means of disinfecting the infected soil.

The following precautionary measures should be taken when additions to the farm herd are planned.

The history of the herd from which additions are to come should be carefully investigated. Swine that appear healthy may be carriers and spreaders of infection.

New purchases should always be kept separate from other hogs on the farm for a period of 10 to 30 days to establish freedom from swine erysipelas as well as that of other infectious diseases before they are permitted to mingle with other swine.

If the disease has been present on the farm in recent years, all pigs should be vaccinated within one to ten days after they are farrowed. This time limit is very important. There is a tendency on the part of some hog raisers to delay vaccination until all pigs are farrowed. This often results in the early pigs contracting the disease and continues to spread the infection. Sows should be bred to farrow on dates as close together as possible.

Dr. Van Es offers the following suggestions for prevention and control of the disease:

"Prevention of the spread of the disease from farm to farm cannot be overemphasized at the present when the infection has not yet acquired a general distribution. Traffic in swine should be under more rigid supervision and control. Public sales establishments, which are apt to have apparently healthy hogs from infected herds consigned to them, may materially protect the interests of their buyers by causing all swine passing through their hands to receive a suitable dose of erysipelas serum. No small amount of mischief may be pre-

vented by such a simple and relatively inexpensive measure."

The culture used in vaccinating for swine erysipelas is a product containing living germs that are infectious to other live stock and to man. Therefore, its use by inexperienced persons should be avoided. Its use is restricted and it may be obtained and administered only by veterinarians approved by your State Live Stock Sanitary Department.

Light Use and Range Management

Condensed from The Cattleman

G. D. Pickford

Pacific Forest and Range Experiment Station, U. S. Forest Service

REAMS have been written and countless words spoken on the subject of conservative use and proper management of range land. Before the ink is dry or the voice has fallen there usually arises a protest that such things as light stocking and fancy management are fine in theory but are impractical to follow. In other words, they won't pay. The land is too low in value to warrant fencing it; the stockman can't afford to reduce his herd to a safe grazing capacity level; and so on.

Such arguments are genuine and seemingly are well founded. They constitute a real challenge to the advocate of conservative grazing and improved management. The improvements *are* expensive, the land *is* cheap. Moreover, reduction in stocking lowers the base from which the ranchman derives his gross cash income; the breeding herd. If conservative grazing and good management are worth their salt they must pay their way in greater profits per animal and in a larger and more stable forage supply. Unfortunately, possibly because practical examples of conservative, well managed range use are hard to find, the discussions pro and con have been based largely on hypothesis, or on the results of range experiments which stockmen tend to view with some misgivings as to their practicality.

This story is about a cattleman who believes in light use and in range management and who has practiced it for 33 years. If he had been a Government agency the results of his efforts would have been shouted from the housetops. Being a cattle ranchman he has gone quietly about his business of raising beef and grass, and in making a good living.

Al Dick was born at Peola,

Reprinted by permission from The Cattleman, Fort Worth, Texas

Washington, in 1880. His father, John B. Dick, homesteaded at Peola in 1874, the first permanent settler east of Pataha Creek in the Pomeroy country. John Dick had been a Government scout and a buffalo hunter in the pioneer days of the West. He and Buffalo Bill Cody, who were the same age, worked together as scouts in 1865. They were with the Government party in that year and explored what is now Yellowstone National Park.

In 1874, John Dick and his wife were in Colorado Springs. They decided to load a wagon with buffalo hides and to trade them in the Walla Walla country. So they made the overland journey, camping and trading with the Indians en route. They arrived in Walla Walla, on July 4, 1874. Having disposed of their trading stock at Walla Walla, they drifted on north looking for a place to locate. They camped one night at what is now Peola, intending to go on in the morning. They remained there the rest of their lives.

The family moved a few miles from Peola to the present ranch on Dry Gulch and Charley Fork in 1884. John Dick's brand was the *S Wrench* which Al Dick still uses. John was a horse ranchman. The brand was not used for cattle until Al Dick took over the management of the outfit in 1907.

When the Dicks first located at Peola, there were no livestock in the country except a few cattle owned by the Indians. The whole country was waving with grass. Al remembers his mother telling how tall the grass was in Dry Gulch and Charley Fork and how the old grass on the ground was so thick and matted that it was soft and spongy to walk upon.

During the period 1880 to 1907, cattle, sheep, and horses were brought into the country in great numbers. By 1907 the Dicks had built up a band of 700 horses. There were no fences, and except for homesteads and ranches, no title to the range; the whole area was a grazing commons. Upwards of a dozen large bands of sheep crossed the Dick ranch each spring on their way to the summer range in what is now the Umatilla National Forest, following the snow line as it receded into the hills. More than a thousand horses and fully as many cattle grazed yearlong in the vicinity.

In 1907 when John Dick turned over the management of the ranch to his son, the range was so depleted that he felt it could never recover. Al, however, believed that it could be rebuilt and told his father he figured if they could reduce their own stock and eliminate the trespass the grass would come back. The first things that Al did were to get rid of the

horses, convert to a cattle operation, and begin a fencing program. The horses were all sold off between 1910 and 1915. The first fence was built in 1910.

What has been the result of this theory of Al's, formed 33 years ago, that depleted range will come back if given a chance and, moreover, that it is a paying proposition to bring it back? The Dick ranch of 7,000 acres is now completely fenced and is cross-fenced into 18 pastures, all in one unit. There are between 25 and 30 miles of fence on the ranch at present. The ranch has supported cattle continuously since 1907, has paid the cost of all fences and improvements, has paid off all indebtedness, and has made Al Dick a good living at the same time.

The present stocking on the ranch, one that will not be increased so long as Al operates it, is 200 head of breeding cows, 10 bulls, 25 to 30 yearling heifer replacements, and 25 saddle and work horses. The horses are kept on the ranch yearlong, the cattle graze there 7 months, making a range load of about 1,980 animal unit months, or 3.5 acres per animal month. Al figures it took 20 acres per month to support a cow on his ranch in 1907.

Starting from range "as bare as a floor" in 1907, Al Dick now has one of the best grassed cattle ranges in the Pacific Northwest, bar none. Some measurements made in August 1942 of the forage in one of his pastures that had been grazed in April and May reveal that the north slopes and ridge tops produce about 1,400 pounds of herbage per acre, dry weight, nine-tenths of which is grass, and really good grass. Three-fourths of the grass production by weight is from Idaho fescue, one-fifth is from bluebunch wheatgrass. These are the two grasses that were here in greatest quantity before the advent of heavy grazing by livestock. Sandberg bluegrass, which is one of the most abundant grasses on depleted range in the Pacific Northwest and which is an indicator of poor range condition, produces only 3 per cent of the forage on the Dick ranch.

The drier south slopes produce less feed, only about 765 pounds per acre dry weight. This feed also runs mainly to grass, less than 5 per cent coming from weeds, and bluebunch wheatgrass is the chief grass in the mixture. Again, Sandberg bluegrass is present only in small quantity, producing about 14 pounds of forage per acre on the average.

The scars of former overgrazing and range depletion are completely erased from the north slopes, where moisture conditions are more favorable. However, the south slopes, particularly near the bottoms of the canyons, still have

some cheatgrass and rattlesnake brome and other annual range plants that are hang-overs from the former depleted condition. Plants of bluebunch wheatgrass are well distributed in the stand of annuals so that it appears that a few years may see the range entirely healed and in full forage production.

The Dick ranch, situated on the breaks of the Snake River, is in steep country. There are no flats on the ridges or in the canyon bottoms. Nevertheless, there is not a sidehill gully on the ranch, nor is there recent cutting of the streams in the canyons, although formerly when the range was depleted the streams had cut deeply. The sidehill, contour trails usually so closely spaced on steep cattle range as to suggest stairsteps down the slopes are nowhere in evidence on the Dick ranch. The soil, especially on north slopes, was found to be soft and mellow and fairly moist after more than a month of drouth. It goes without saying that Al Dick is doing a marvelous job of erosion control and watershed protection with the same grass that produces his beef.

How has Al Dick brought all this about? In the first place he has stocked conservatively. Right now he allows 3.5 acres per animal unit month on range with so much forage that you can hardly tell it is used after the livestock have finished grazing. In Al's words, "They have so much feed that they can't possibly eat it all, and that is the secret of building good ranges." In the second place, he protects the range against trespass by fencing the boundary. In the third place, he controls the seasonal use of his range by cross-fencing.

Of the 18 pastures on the ranch, five are used only every other year because they contain some unfenced farm land that is summer - fallowed in alternate years. He practices this same policy on his two winter pastures that are grazed in January and February, a season during which perennial grass is particularly susceptible to injury as it usually begins growth in February in the mild climate of the lower Snake country. Thus his winter pastures get protection against grazing for one winter and two growing seasons after each time they are used. His two calving pastures are used in alternate years during March, April, and May and at no other time. The cows and calves go to the summer range on the Umatilla National Forest on June 1 and return to the ranch in late October. One large pasture nearest the forest allotment is used every year from October to December after seed maturity. Al says his stock do better when they can be turned on fresh feed

frequently. It is also true that the feed itself does better, and it is probable that the rotation and deferment that Al has given his range has been fully effective in building it up as the conservative stocking that he has practiced, for it has kept his cattle from congregating too long and tromping out soil and forage in favored locations.

Good range management practically guarantees good livestock management. Al does a lot of things in handling his cattle that don't cost much but are quite remunerative. For example, every cow that goes to the rough, brushy summer range is belled. That keeps his stray loss in the mountains to a minimum. He controls the breeding season so that calves are dropped during April and May. By having the herd confined to pasture he can ride the bunch frequently during calving. The whole herd is inspected at least twice a day during calving time and usually a rider is present constantly during daylight. The last several years Al has practiced bringing the newborn calf and its mother to a shed in the pasture and giving them shelter for a day or so. He has a heated tent for the rider and if the calf is chilled they put it near the stove and warm it up. All of which may sound extreme in the usual idea of range cattle ranching, but this year Al turned out on summer range 190 calves from 200 bred cows. And that sounds like a 95 per cent calf crop to me! All of which didn't cost him a dime as there was little else to do on the ranch during that period. But it brought him in nearly $3,600 of clear profit considering that range calf crops average about 50 per cent in this country and figuring $40 a head for the fall calves.

Al sees to it that his cows go into calving in good condition, usually feeding them heavily immediately prior to that period. However, if the winter is open, the feeding is unnecessary since the stock have an abundance of bunchgrass cured on the stalk. In the winter of 1940-'41, Al fed 3 tons of hay to his range cattle.

There are no steers on the Dick ranch. Al sells all of his increase as fall calves except for 25 or 30 heifers that he holds for replacements. Thus his range does not have to carry the load of fattening steers and, furthermore, he is able to winter his outfit with far less hay, which is rather scarce in this range-wheat country.

So, it seems that while Federal and State agencies have been studying range conservation, developing improved management practices and clamoring for their acceptance, Al Dick has been practicing everything in the book for a third of a century.

Beef Production Can Be Stepped Up

Condensed from The American Hereford Journal

A way to produce more beef is indicated by continuing studies in cattle production conducted co-operatively by divisions of the Washington Agricultural Experiment Station, Pullman. Professors M. E. Ensminger, Hector G. McDonald and Jerry Sotola have been handling the animal husbandry phases.

In brief, it boils down to getting cattle to market much more quickly by moving weaned calves from range lands to farms for a year of grazing and finishing on surplus pasture and feed crops. This procedure would help to free the range lands, already grazed nearly to capacity, for the opportunity to maintain more cows which in turn would mean more calves. It would also help to insure important use of grasses and forage crops planted as a part of the USDA Conservation program, and it would help everyone by stepping up meat production.

Whereas range steers are generally marketed off grass at two-and-a-half years, a full year was sliced off that production time with an experimental group of 25 range calves grown and fattened last year at the Washington college's main experiment station. This group was not only pastured but was simultaneously fed barley to rush production as much as possible.

This year, to get data of a slightly different character, an experimental group of 23 head was given a more restricted treatment, with no barley being fed during the period on pasture. These steers were marketed in Spokane, Wash., Feb. 8 at premium prices.

The steers were purchased Dec. 16, 1941, from Melville Bros., range cattle operators, near Sprague, Wash. On that date their average weight was 561 pounds. For the 143 days running to May 7, 1942, they were fed a roughage ration, consisting of sunflower silage and chopped alfalfa hay, followed by a 90-day period on pasture (May 8 to Aug. 5, inclusive). Then came a drylot feeding period running from Aug. 6, 1942, to Feb. 6, 1943 — 184 days on a ration consisting of a full feed of grain (20 percent oats and 80 percent barley), plus alfalfa hay.

Washington State College takes credit for 471 pounds of gain. Of this, 181 pounds was made on grass and 290 pounds in the feedlot. All of these feeds are surplus commodities, while beef is extremely scarce. The Northwest,

Reprinted by permission from The American Hereford Journal, March 1, 1943

for instance, is a deficit area in beef and even more of a deficit area in pork.

Here is the way the results ran for live-weight gains per acre grazed for the five kinds of pasture: Smooth brome, 89 pounds; crested wheatgrass, 102; smooth brome grass-alfalfa mixture, 191; crested wheatgrass - alfalfa mixture, 213; and crested wheatgrass, alfalfa and smooth brome grass mixture, best of all, with 224 pounds.

Here are the figures on the relative carrying capacity (or acres required to carry one steer for the 90-day grazing season in this project): Smooth brome, 1.75 acres; crested wheatgrass, 1.71 acres; smooth brome grass-alfalfa mixture, .65 acre; crested wheatgrass-alfalfa mixture, .8 acre; and crested wheatgrass, alfalfa and smooth brome grass mixture, .69 acre.

These steers sold Feb. 8 at Spokane to Armour & Co. for $15 per cwt., a full dollar a hundred over any other cattle selling at the same time. In weight, they averaged 1,002 pounds per steer.

Pastures containing alfalfa yielded approximately twice as much beef per acre as pastures consisting of pure grass stands, and gave no serious difficulty with bloat. Even under this year's changed schedule, with no grain fed during the grazing season, the experimental cattle are being brought to market eight or ten months sooner than if they had been marketed as grass-fat steers directly from the range, thus contributing meat for the nation in late winter when the supply is at a low ebb.

Hubam Advantages

Hubam, an annual sweet clover, has several advantages over the larger biennial varieties, farmers in Webster county, Iowa, have found. In parts of that county, soil is a tough, black gumbo that will not stand spring plowing. Little benefit would be obtained by plowing biennial clover under in the fall of its first year, and letting it stand thru a second would mean loss of a year's crop from the ground. The annual variety develops a good supply of root nodules by late fall, tho its nitrogen production is not as great as that of second-year biennial sweet clovers.

Albert Sackrison and Paul Fohlin, neighbors, have found they can get emergency hay crops from the Hubam in years when alfalfa yields are low. Fohlin mowed 10 acres, raked it with a side-delivery implement when it still was tough, saved all the leaves and got 2 tons of hay an acre. Sackrison's yield was somewhat lower, but quality of the hay was high. —*Capper's Farmer*

Trends in Fertilizing Apple Orchards

Condensed from New England Homestead

Lawrence Southwick

PROPER fertilization of apple and other fruit orchards is recognized as one of the foremost requirements of successful culture. The high natural fertility of many of our virgin soils has been depleted by long-continued cultivation and the removal of crops year after year without sufficient replenishing of nutrient elements and organic matter. In general, nitrogen has been the principal deficient nutrient element in northeastern apple orchards. The nitrogen fertilizer program, which early became the standard orchard procedure on a great majority of fruit farms, has, on the whole, given good results. In many instances, the response of bearing orchards to applications of materials yielding quickly available nitrogen, as nitrate of soda for example, was almost miraculous. Weak, unproductive orchards became vigorous heavily yielding orchards and assets instead of debits to farm enterprises. Commercial nitrogen fertilizer has been relatively cheap and plentiful due not only to abundant supplies from the natural deposits in Chile but even more to the development of methods to convert air nitrogen (80% of air) to the nitrogen fertilizer in the fertilizer bag. This availability of cheap nitrogen tended to cause increased usage which, with few exceptions, gave increased growth and yield of fruit trees.

However, reports soon were heard of declining performance of the nitrogen alone program. Growers found that nitrogen could be used too freely for maximum returns. Some sensed a reduced response to their regular nitrogen program and found further that increased amounts were not particularly effective. In field experiments at the Massachusetts Agricultural Experiment Station, the short-comings of the nitrogen alone program became apparent when trees failed to respond adequately to customary commercial nitrogen applications. Heavier applications notably failed to bring about an improved response. A logical explanation was that the nitrogen fertilizer program caused some discrepancy or unbalance in the supply of essential nutrients.

Our northern neighbors in Canada, as well as our friends across

Reprinted by permission from the New England Homestead, Springfield, Mass., March 6, 1943

the Atlantic in England were reporting at this time outstanding responses to potassium. A serious leaf scorch condition with subsequent poor tree performance was diagnosed as due to a deficiency of potassium. As a result of experiments, it was found that these trees required fertilization with potassium as much as, and in some cases even more than, with nitrogen.

No such pronounced need for potash was evident in this country. Probably the majority of orchards in the northeast may be expected to continue to respond satisfactorily to the nitrogen program for many years to come. However, isolated cases of deficiency conditions notably in New York, Pennsylvania, and Massachusetts seemed to warrant some consideration of potash fertilization of orchards. At Massachusetts State College, the addition of potassium to some of the nitrogen fertilized trees seemed to have a corrective effect with a gradual improvement in the appearance and growth of the trees. Among fruit growers, a considerable trend toward the use of so-called complete fertilization of apple orchards developed. In many commercial orchards, the use of N-P-K- fertilizer mixtures became standard practice. Since growth of cover-crops in cultivated orchards and grass in sod orchards benefited particularly by the inclusion of phosphorus, the use of complete fertilizers was a factor in soil conservation and the buildup of vital organic reserves. Variable reports as to the success of complete fertilization have been made. At least from the long-time point of view it seems logical that N-P-K- fertilization approaches more nearly a balanced fertilizer program than the use of nitrogen alone. And since apple trees actually need more potash than nitrogen in growth and fruiting, it again seems logical that sooner or later this need for potassium may not be fulfilled by an unreplenished soil. Through loss by leaching, as well as by removal in crops, sometime the reserve must be depleted. This is exactly what has happened in some areas especially where the soil is light and sandy. And as stated above, in orchard experiments at M. S. C. there is evidence that potassium (in medium amounts) added to nitrogen has given better results than nitrogen alone over a number of years.

Apple trees use phosphorus though in much reduced amounts compared to nitrogen and potassium. The need for applying phosphorus to orchard soils has never been proven in so far as direct tree response is concerned. Evidently, our soils have enough phosphorus to supply the needs of fruit trees for a long time to

come. Hence, the principal reason for using phosphates is to favor the growth of annual or perennial cover crops and grass sod. In fact, at M. S. C. some trees fertilized with nitrogen and potash seem to have done better than trees in the same orchard given phosphorus in addition to N and K. This may be explained on the basis that the phosphorus increased the growth of grass which in turn took more of the added nitrogen leaving less for the trees themselves. This would indicate the need for caution in fertilizing orchards with the low nitrogen complete fertilizers which will be available this year. Farm manures, orchard mulching, and some degree of cultivation should help in alleviating the nitrogen shortage.

Another generally unexpected result of the increased use of N-P-K fertilizer and especially high K fertilizer is the recent appearance of magnesium deficiency symptoms (including leaf scorch and chlorosis and early, and distinct sequence of, leaf fall) in a number of orchards in Massachusetts, especially on very acid soils. This too can be explained on the basis of unbalanced fertilization even though the so-called "complete" fertilizers may have been used. It emphasizes the necessity for redefining *complete* as it is used in fertilizer description and it gives a hint as to the direction that orchard fertilization is to take in the future. More and more attention will be given to a *balanced fertilizer program.* Too much of one fertilizer element may be about as bad as a paucity of that element. Thus, the nitrogen program finally resulted in the need for potassium. And now the high buildup of potassium in some orchards has given rise to the need for magnesium fertilization. What further development of the *balanced fertilizer program* may be required remains to be seen. In Florida, a recommended fertilizer program for citrus includes nitrogen, phosphorus, potassium, calcium, magnesium, copper, and zinc. It probably will be many years before some of these or other elements become limiting in the production of deciduous fruits in the northeast. But the fact that potassium, boron, and magnesium have come into the picture in recent years may indicate a trend in fertilizing orchards in this area.

Broilers Grown in Greenhouse

Condensed from The Ohio Farmer

E. W. McMunn

BROILERS by the thousands—from greenhouses formerly devoted to the production of nursery stocks! This is the answer of D. Barrett Cole of Cole's Nursery Company, Lake County, to the nation's demand for increased food production. Located in the heart of Ohio's nursery belt, Cole has spent his lifetime in the nursery business, but with the coming of war and the need for greater food production, he switched two of his four greenhouses to broilers. He emphasizes, however, that he is not going out of the nursery business, but simply turning some of his present equipment to direct food production.

The Secretary of Agriculture has asked for four billion pounds more poultry meat this year than was produced in 1942. If Mr. Cole continues or increases his present production he will produce more than 100,000 pounds of broilers this year where only plants, flowers and shrubs were produced last year. Truly, a master stroke in the Food for Freedom battle!

Unique in the extreme is the switch-over of a greenhouse to broilers, but so successful has it been that Cole is now marketing about a ton of meat per week. Beginning with his first lot of 500 chicks last November 24, he gradually increased the number until he was starting 1,000 per week, and then 2,000. Chicks purchased to the first of this month totaled 25,300. He estimates that the 12,000 to 14,000 square feet in the two greenhouses he is devoting to broilers will accommodate 20,000 birds at capacity.

Last summer Cole produced 75 acres of vegetables outside for market and 115 acres of field crops. After deciding to switch some of his greenhouse capacity to food production, he was faced with a choice of crops and after considering cucumbers, tomatoes, etc.—he hit upon broilers. He had always been interested in poultry, he had the shelter, steam from the boiler would provide heat, and he had the will to begin.

A minimum of new equipment was required, but here the difficulty arose of securing even that. Using the regular greenhouse flats in which to start the chicks, Cole depended at first upon electric light bulbs for additional heat, but has now installed commercial electric heating units. He has 23

Reprinted by permission from The Ohio Farmer, Cleveland, Ohio, March 20, 1943

of these at present. After the first three to five weeks the chicks are moved from the brooders to other units, still in the same greenhouse, where they have the light bulbs for a little extra heat. In another two or three weeks they are moved to the second greenhouse where they are kept in wire-enclosed pens. Temperature in the starting house is held near 70 degrees and for the older birds it is about 60 degrees.

It took considerable shopping around at hardware and equipment stores to find the necessary feeders, waterers and other small equipment, but finally this was secured, a few pieces at a time. The wire mesh for penning the older birds was salvaged from some already on hand for use in nursery displays. Because of the fact that he had the houses and so much other equipment that could be adapted to broiler production, Cole estimates that even including labor, it did not take over $1,000 to equip his plant.

It is a drastic change for men, formerly engaged in growing plants and flowers, to take on the brooding of a houseful of chicks, but Cole reports that his men have taken to the new work very well indeed. Of course he selected men from his regular labor force who expressed some interest in poultry and when taking on new help has hired those with some poultry experience. At present seven or eight men are kept busy in the poultry plant. The regular labor force engaged in the nursery business in the past has averaged 15 to 20 men.

By purchasing pullorum-tested chicks of good quality and then following sound sanitary practices, this producer has managed to keep disease losses to a minimum. He uses several of the heavy breeds such as New Hampshire Reds and White Rocks, and has also had good results with some of the heavy hybrids.

When he started his first chicks last fall, Cole expected that it would be necessary to truck the finished birds to Cleveland to find a market, as the volume of business increased. So brisk has been the demand, however, that orders are always ahead of the supply, and he says he thinks the trade would take 10 times the birds he has for sale. The broilers are killed and picked at the farm and go to stores, dealers and a very few at retail.

Emphasis on Labor-Saving Methods

Included in the modern equipment of this plant is the latest thing in mechanical pickers, a cylindrical gadget armed with rubber fingers. When a broiler is held up to this rapidly rotating device the feathers are fairly "zipped" off in a fraction of the time it takes to hand-pick. With care and practice it can be done

with no injury to the carcass.

While the greenhouses have turned out to be a fine place for winter broiler production, Cole does not think they would be satisfactory during the hot weather of mid-summer. He is not just sure as to his plans by that time, as they will depend partly upon the trend of prices. If he continues with poultry during the summer he expects to move into another building—probably a packing and storage building used in the nursery business.

One place where the broilers will fit in with the nursery operations is in the production of manure with a high nitrogen content. During past years he has bought manure at a cost of $2,500 to $3,000 per year to fertilize the ground used for the nursery plantings. While his broiler production on the present heavy basis is maintained, he does not believe it will be necessary to continue purchasing manure from outside sources.

While Cole has already produced more poultry meat than many men do during a lifetime, he emphasizes that he is not yet an expert and that he depends upon the experiment stations, extension service, and other sources for much of his information as to the best methods of feeding, management and disease control.

Eggs

A new process for maintaining the quality of market eggs has just been announced by the Missouri Agricultural Experiment Station. It consists simply of heating the egg at a temperature of from 130 to 140 degrees F. for less than 10 minutes in water or oil. This treatment has both a sterilizing and pasteurizing effect.

Its greatest value comes when it is used with fertile eggs, which compose more than 75 percent of the crop marketed in the Midwest. Fertile eggs so heated and then kept at 100 degrees F. for 13 days have remained edible, while untreated eggs reached in inedible condition between the second and third day. The process is useful with infertile eggs by reducing the rate at which thick white is converted into thin watery white. No harmful effect on taste or cooking quality from the treatment has been found. The process has received the O.K. of the Army Quartermaster Corps, which thoroly tested eggs so treated at a desert training center recently. The effect this process may have on marketing methods after the war is worth thought by every poultryman.

—*Successful Farming*

Nicking in Dairy Cattle Breeding

Condensed from The Ayrshire Digest

Jay L. Lush

Professor in Animal Breeding, Iowa State College

NICKING is a term not often used in scientific writings because it is a bit vague in its meaning and because the situation it describes may have been caused by several quite different processes. However, breeders do use it sometimes, meaning in a general way that the results of some mating or of a whole group of matings were unexpectedly good. In such cases they may say that this was "a lucky nick" or that the two parents "nicked well." Not often is the term used when the results were unusually bad, but occasionally it is said that two individuals "did not nick well" or "nicked poorly."

Three quite different kinds of processes can cause matings to turn out much better than the breeder had expected. Each will be explained here separately, in order to make clear just what did happen or may have happened in a particular case of "nicking."

In the first place inheritance is a sampling process whereby each offspring gets only a sample half of the genes (the hereditary units) which each of its parents has. A parent will sometimes transmit to one offspring much better inheritance than it does to another. This is no more mysterious than what would happen if a barrel contained 70 sound apples and 30 which were partly rotten and we took entirely at random a sample 50 apples out of the barrel. We might get anywhere from 50 which were all sound to as many as 30 rotten ones and only 20 sound ones. Either of these extremes would be rare but they could happen. On the average we would expect to get somewhere near 35 sound and 15 rotten ones.

Because of the part which chance plays in determining what the parent will transmit from among the inheritance it has, it will sometimes happen that one offspring from a particular mating will get, both from its sire and from its dam, better inheritance than is fairly representative of either of them — perhaps even better than they will ever transmit again to any other offspring. The one lucky offspring will be even better than its best parent,

Reprinted by permission from The Ayrshire Digest, Brandon, Vermont

instead of being about equal to an average of their breeding worth as is usually expected.

Cases where "nicking" was caused by this can be distinguished from other kinds of "nicking" in that a full brother or sister from the same mating is not likely to surprise the breeder in the same way. Each additional offspring gets a fresh sample of inheritance from its parents. The fact that one got a better sample than typical has nothing to do with what the next one is likely to get.

Where a whole set of full brothers and sisters were better than average, it is not likely that such sampling accidents of inheritance were responsible. If we have only one such offspring, this may well have been the cause of our surprise and good luck. Hence in progeny tests or other breeding procedures where we judge an animal on the average of many of its offspring, we can almost ignore this cause of nicking, even though it may be a very prominent explanation of the variation between individuals. It is to make this individual sampling error unimportantly small that we insist on having several offspring for proving a sire, and do not pay much attention to cases where the sire has only one or two.

A second cause for a whole set of brothers and sisters being surprisingly good is that we may have underestimated the breeding values of one or both parents. Our judgment of that is never perfect and sometimes may have only a little relation to the facts. Occasionally we will estimate the two parents as mediocre or not much better, but they really do have breeding values far higher than we think. In such a case their offspring surprise us favorably. The more offspring there are, the surer we are it was not an accident but a genuine case of "nicking." If we have underestimated the breeding value of a sire, then this pleasant surprise will tend to persist among all of his offspring and will make his index high, if it is a characteristic for which we can compute an index.

If it is the dam who was so much better than we thought but our judgment about the sire wasn't particularly wrong, then the whole set of full brothers and sisters from that particular mating will surprise us pleasantly but the sire's other offspring out of other dams will not surprise us and we will have a case where he seems to "nick well" with that one dam but not to "nick" with the others. Really all that is at issue here is just that the dam's transmitting ability was considerably higher than we thought from the evidence we had at hand before the offspring were available.

A third cause of "nicking" is

that the different units of inheritance sometimes cannot produce their favorable effects unless a certain combination of them is present. This sort of thing is familiar to all of us in machines, even in fairly simple ones such as a gun. The firing of the gun depends not merely on the hammer or the trigger or the spring but on all of these parts (and others) being put together and each in the right position to cooperate with the others. One can not divide among the parts the credit for firing the cartridge by saying, for example, that this was caused 20% by the hammer, 60% by the trigger, and 20% by the spring. The act was a unit which cannot be divided up and which required the active cooperation of all of the parts. It is almost meaningless to say that one trigger is better than another unless we specify what kind of a hammer and spring it is to work with. "Good" and "bad," "desirable" and "undesirable," almost cease to have any meaning as applied to the individual parts; it is how the combination as a whole performs which counts.

Animals are far more complex than the machines and instruments we use. Among their parts are certainly some of these joint interactions necessary for the animal to function well. But in the sampling processes of inheritance these combinations are reshuffled. Few offspring will inherit exactly the same combination their parent had, especially if that combination had many parts.

Whether this sort of complexity is frequent enough and important enough that we should pay much attention to it, or whether it is so rare and unimportant that it is scarcely worth bothering about, cannot be foretold in advance. Apparently the actual experiments required to determine that will be long and complicated and expensive. We cannot deny that such effects exist. We can, if we like and as far as the present evidence goes, believe that they are usually unimportant.

The laws of inheritance are such that complex effects of this kind are not likely often to be important in populations where those selected to be parents are mated almost at random; whereas they will be of more importance, perhaps of great importance, when we cross breeds, inbred lines, or highly linebred families.

A typical case of this kind of "nicking" might arise about as follows: Suppose three different genes must all be present to produce a certain desirable effect, but that no two of them can begin to produce that effect without the presence and cooperation of the third. Then suppose a sire who has two of those genes but not the third, is mated to females from a family where nearly all

the individuals have that third gene although they nearly all lack the first and second one. Then neither the sire nor the dams show any trace of the effect which these three genes will produce if together. But when this sire is mated to these dams many of the offspring will possess all three genes and thus show the desirable characteristic. As concerns this characteristic, we will have offspring averaging far above the level of their parents.

As long as the dams come from various families and are not closely related to each other, it is not likely that they will *all* have the same genes or all lack the same genes necessary for such an effect. But if the dams all come from one rather closely bred family, the probability of their having the same genes becomes rather high and we can expect to see more "nicking" from this source. Except when crossing inbred lines or strongly linebred families, the only cases of this kind of "nicking" we are likely to see are when a sire, X, is mated to two or more groups of females, each group being sired by a different sire. If the daughters of A mostly received from their sire the genes necessary to "nick" well with those of X, while the daughters of B failed to receive those genes, then the outward result will be that X when mated to daughters of A will produce good offspring and get a high index, whereas when mated to daughters of B this same X will produce only mediocre daughters and will get a correspondingly low index. If it is only the sampling variations of Mendelian inheritance which are responsible, this difference will disappear if the numbers of daughters from each of the two or more kinds of matings are large. But if it is genuinely a result of this kind of "nicking," then the more daughters we get from each mating, the clearer the difference will become and the surer we will be that it is not accidental.

In my opinion the admittedly scanty evidence indicates that "nicking" is comparatively unimportant in most of our farm animals under the breeding systems by which we produce most of them at present. It does occur but not often enough or consistently enough to introduce *much* error by assuming there is none of it. The sires and dams are not homozygous enough and one family of dams is not so distinctly unrelated to the other families that it will often happen that a sire mated to one family of females will produce uniformly good offspring and to another family uniformly poor offspring, even if there actually is much "nicking" among the genes. "Nicking will be of some importance in crossbreeding and in the outcome of

crossing various inbred lines or highly linebred families within a breed. But as yet the commonly used breeding systems do not often cause the production of families any more distinct from each other than unrelated sets of full sisters.

Where it is thought that some "nicking" of this kind has occurred, the surest way to have a moderately good chance of retaining the desired effects is to linebreed by mating together individuals which are closely related to the one showing the good effects but are not otherwise related. Such relatives of individuals showing the desired effect are more likely to possess at least some of the genes necessary for the desired combination than unrelated individuals are. The mating of these together increases the chance of recovering the desired combination in the offspring. This is "linebreeding."

The available data indicate that "nicking" from this third cause, although real, is a comparatively unimportant aspect of animal breeding. It is interesting and challenges study, but it should not be allowed to detract our attention from what is usually more important; namely, trying to control or allow for environmental conditions and to use information about relatives in order to make a better estimate of an animal's breeding value than can be had by accepting its own record or appearance at face value. Most of the economically desirable and important characteristics in our animals are subject to considerable influence by environmental and accidental circumstances. Even after we have made the best allowance we can for relatives and for known environmental circumstances, there is often a rather wide gulf between our estimate of an animal, based on its own individual performance or appearance, and its actual transmitting ability.

Foolproof Hen Feeding

Condensed from Capper's Farmer

A hen can be trusted to balance her own ration. Her appetite is a better guide to adequate nutrition than any farmer's judgment. She won't neglect to eat if the feed is before her, and she'll take what she needs when she wants it.

That's what Minnesota farmers say, and a few in other states back them up. It's the same free-choice or self-feeding system that has been proved repeatedly for hogs extended to the poultry flock. One of its big advantages is that hens don't go to roost with empty crops no matter how rushed the flock owner is with cultivating, haying, soybean combining, corn husking, or helping the neighbors thresh and fill silos.

The old autocratic system went out when price of eggs was so low that the more a hen laid, the greater liability she became. So Minnesotans sought a simplification of feeding methods. They had been buying a 32 to 38 per cent protein supplement and adding ground grains to make a laying mash. This brought the protein content down to about 20 per cent. Additional grain was fed in separate hoppers or as scratch on the floor. Why wouldn't it be possible to feed the supplement straight and offer the grains that had been going into mash as whole grain?

From that question, the cafeteria method of feeding hens evolved. But the more cautious poultry keepers would not make the change without authoritative advice. They queried H. J. Sloan, poultryman at the Minnesota College of Agriculture. He couldn't answer positively right away but set up a series of experiments which would make flocks of Rhode Island Reds and White Leghorns answer. First, he tested a 26 per cent mash and 26 per cent supplement fed free choice with whole corn, against hand-fed 20 per cent mash and whole corn. Then he fed oats and corn as grain with 21 per cent mash against oats and corn with 26 per cent supplement and 32 per cent supplement, all free choice to both breeds. A third test compared oats and corn with 20 per cent mash, 26 and 32 per cent supplement. Currently, 38 per cent supplement is being tested against the other combinations.

To date, cheapest egg production, 6.3 cents a dozen, has been made on corn and oats with 26 per cent supplement, fed free choice, to White Leghorns. The

Reprinted by permission from Capper's Farmer, Topeka, Kansas, Feb., 1943

return over feed, at 2 cents an egg, was $2.42, compared with $2.56, for a group of Rhode Island Reds fed oats and corn with 21 per cent supplement, free choice, to make the feed cost a dozen eggs 6.4 cents. Leghorns fed oats and corn with 32 per cent protein supplement produced eggs for a feed cost of 7.9 cents a dozen in one test and 7.3 in another. Returns above feed cost at 2 cents an egg were $1.96 and $1.98, respectively. Free-choice corn and 26 per cent supplement produced eggs for a feed cost of 6.5 cents a dozen and returned $2.12 over feed cost. When oats, corn and 26 per cent supplement were fed, the feed cost of a dozen eggs was 6.8 cents and the return above feed, $2.25.

Professor Sloan wasn't ready to make definite recommendations at midsummer, but he did observe that adding oats to the corn as a whole-grain mixture reduced feed cost. Also feeding grain only in whole form lowered ration cost. The commercial poultryman, who is accustomed to looking after details, might find some advantage from continuing on the mash and grain system, whether he hand feeds or self-feeds. But he thinks farmers who have varied and perhaps more important enterprises might actually get better results from their flocks thru offering grain and supplement free choice because birds would be automatically fed, and chances of neglecting them would be lessened.

H. T. Burau, Otter Tail county, shifted to this cafeteria or free-choice system 3 years ago and estimated he has been getting as good results, maybe better. His flock produces at a 65 per cent rate and he gets 3 cents a dozen premium during the hatching season because of an increase in hatchability.

"I substituted whole grain for the scratch and for the ground grain that formerly went into the mash," he said. "A 38 per cent protein supplement is fed in one hopper, corn in another and succotash, wheat and oats mixture, in another. If the wheat and oats were grown separately, I would feed them separately. This system saves grinding, mixing and feeding more than once a day."

Even fewer feedings have been provided by Robert Bergstrom, Kandiyohi county. He attached a half-hopper-type feeder to the wall of his new laying house. The top slopes steeply to discourage perching on it. Capacity is 15 bushels. The feeder was supplied with corn, wheat and oats for the summer layers. Supplement is available in floor feeders.

Linc Tow, 50-50 operator of Owen Elliot's farm in Benton county, Iowa, shifted to the free-choice system in raising chicks this year. Pullets were raised on

corn, oats and wheat in one hopper and a 32 per cent supplement in another. Mr. Tow is convinced that his hens will do as good a job of balancing their own ration as his hogs always have done. With help scarce, he is seeking every means possible to save time and labor.

One commercial poultryman who has found the free-choice system profitable is Rene Isler, Stephenson county, Illinois. Under the old system of feeding 20 per cent mash and scratch grain his best average production was 60 per cent. A year ago he began feeding a 32 per cent supplement, containing no grain, with whole grain in separate hoppers. At the same time he reduced the number of birds a pen from 200 to 125. Result of the two changes was an increase in egg production to 70 per cent. Feed costs went down 20 per cent.

"I got more eggs from a cheaper ration," he said. "One of the factors in the 20 per cent saving was that the hens ate more grain. Another was that I eliminated the grinding and mixing cost. The increase in production was largely due to better-balanced ration. A hen's appetite for grain and concentrate varies with her needs and that is affected by the season and the temperature. If she has a chance, she will choose the right proportions of grain and protein feed." The only departure from the new system of feeding was in case of breeding hens. He limited their grain.

A protein supplement is easy to prepare from a standard laying-mash formula. Professor Sloan used the Minnesota All-Purpose Mash to explain the conversion. It calls for 275 pounds ground yellow corn, 100 of bran, 200 of wheat flour middlings or ground wheat, 160 of ground oats, 50 of alfalfa-leaf meal, 100 of meat scrap, 50 of soybean oil-meal, 50 of dried milk, 10 of salt and 5 pounds of fish-oil concentrate containing 400 per unit of vitamin D and 3,000 of vitamin A. This makes a 19 per cent mash. To convert it into 26 per cent concentrate, leave out the yellow corn and oats. To make a 32 per cent concentrate, leave out corn, oats and the wheat middlings or ground wheat.

There is a shortage of several ingredients in this mash, such as meat scrap, dried milk and fish oil, and poultrymen who compound their own rations may not be able to buy them in small quantities, or they may have to use substitutes. The ready-mixed concentrate in the protein percentage desired will be easier to obtain from the feed dealer, the mill, the mixing station or the custom processor.

If eggs are not to be used for hatching, Cora Cooke, Minnesota extension poultry specialist, sug-

gests the soybean oilmeal may be increased to 75 pounds, the dried milk reduced to 25 pounds and the fish-oil concentrate reduced to 4 pounds. Liquid milk kept before the hens will replace the dried milk and half the meat scrap if 10 pounds of bonemeal are added. Fish meal is a cheap substitute for meat scrap when the price is less than one-fourth higher than meat scrap.

Fish oil may be omitted in summer if birds are outdoors 2 or 3 hours a day. Likewise alfalfa meal can be omitted when birds are on green range. A dry compound, vitamin D carrier, has been developed to replace fish oil and is in commercial production. If dehydrated alfalfa-leaf meal is used, the amount may be reduced to 25 pounds.

In Professor Sloan's tests, introduction of oats into the grain hoppers not only reduced grain costs, but because the oats contain more protein than corn, hens reduced their consumption of concentrate somewhat. The oats are fed unhulled, but should be heavy. If barley is substituted for corn, amount of alfalfa-leaf meal in the Minnesota mash should be doubled. Proso or hog millet can be used to replace half the corn.

Tobacco Plant-Bed Management

Condensed from Kentucky Farmers Home Journal

Russell A. Hunt

University of Kentucky Extension Service

AN abundance of healthy, vigorous, stocky plants ready for transplanting at an early date is essential to the production of high-quality tobacco. Sufficient plant-bed area should be prepared to provide the plants needed for the entire crop at the first and second pullings. The first plants pulled from beds are generally quite free from disease, but at each successive pulling the plants are likely to carry more disease, particularly mosaic, which of course contributes to the amount of disease in the field. Vigorous, stocky plants aid materially in obtaining a good stand. They recover quickly from the effects of transplanting, are not easily killed by bad weather and often survive attacks of insects.

Reprinted by permission from Kentucky Farmers Home Journal, March, 1943

Having the plants ready for early transplanting has a number of advantages. The field soil then is usually in better shape than later, for obtaining good stands, and the early-set crop is more likely to escape injury from drouth, more likely to have favorable weather for harvesting and curing, and less likely to be affected seriously by wildfire, rust, and other leafspot diseases.

1. Select fertile, well-drained land for the bed, preferably with a slight southern or eastern slope.

2. Select a site free from shade, especially in the forenoon. (This is helpful in preventing blue mold.)

3. Use a new site for the plant bed each year, a great help in avoiding black root-rot and blue mold.

4. Where a burley tobacco crop is to be grown on land which has grown tobacco in recent years, choose a variety resistant to black root-rot, such as Kentucky Experiment Station No. 16. On virgin land, or in very long rotations, a variety not resistant to this disease may be as satisfactory, if one can be found which gives a yield comparable to that of Kentucky Experiment Station No. 16. Where Fusarium wilt is prevalent, Kentucky Experiment Station No. 33 should be grown.

5. Before sterilizing, prepare the seedbed thoroly, so that only a very light raking will be necessary before sowing the seed. Deep stirring after sterilization results in weedy beds.

6. Fertilize a steamed bed with a complete fertilizer such as 6-8-6 or 4-8-4, at the rate of 4 to 5 pounds per 100 square feet, and rake in very lightly. A low-potash fertilizer is preferable for a heavily burned bed. *Caution*: Heavy fertilizing of plant beds may put too much soluble salts in the soil, which in dry weather causes the plants to yellow and die.

7. Provide 400 to 450 square feet of bed for each acre of burley tobacco to be grown, and 250 square feet for each acre of dark tobacco.

8. Sow 1 level teaspoon of seed to 400 to 450 square feet of bed. Seeding may be done as soon as weather permits, which is usually the last half of February, or the first half of March. Perhaps the most favorable time for seeding is from the first to the middle of March in southern and western Kentucky, and from March 10 to March 20 in central and northern Kentucky. It is a mistake to work the ground when it is wet in order to sow early.

9. To distribute the seed evenly, mix the seed with screened wood ashes, fine sand, or commercial fertilizer. Going over the bed several times, sowing part of the seed each time assures even distribution.

10. Box the bed tight, using

1"x6" material. Use a good grade of tobacco cotton. Draw it over the tops of the boxing boards and fasten to the sides of the board. This will keep out flea beetles, cut-worms, and grasshoppers and will double the life of the tobacco cotton. Since a shortage of cotton is likely this season, it is essential to conserve supplies.

11. In dry weather, water the bed thoroly every 4 to 6 days. Use 50 to 60 gallons for each 100 square feet. Watering a large bed is laborious, but in many seasons is necessary if strong, thrifty plants are to be produced. Tobacco growers can well afford to provide equipment for watering plant beds rapidly. Seldom are there seasons when watering is not needed.

12. Control mosaic. Plants are usually infected with mosaic from the hands of workers who chew or smoke barn-cured or "home-spun" tobacco. To prevent mosaic the pockets of the workers should be brushed clean and the hands thoroly scrubbed before going to the plant bed, and the workers should not smoke or chew while working at the plant bed. Take this precaution when—

(a) Applying bluestone-lime mixture
(b) Weeding plant beds
(c) Watering beds
(d) Applying poison dusts, sprays, or poison baits
(e) Pulling plants
(f) Setting plants

13. To control wildfire and angular leafspot apply with a sprinkling can, through the canvas, 3-4-50 bluestone-lime mixture (3 pounds copper sulfate, 4 pounds lime, and 50 gallons of water). This should be applied at the rate of 1 quart per square yard, *first* when the first true leaf appears; *and then again* from 8 to 10 days later.

14. To destroy cutworms, use 1 part of Paris green and 50 parts wheat bran mixed with enough water to make a fairly thick mash. Scatter thinly over the bed late in the afternoon. This treatment should be repeated at least twice, at intervals of 3 days, for complete control.

15. To control flea beetles, dust the plants with a mixture of 1 part Paris green, 5 parts of lead arsenate, and 4 parts hydrated lime. Apply at the rate of ¾ pound per 100 square yards. Or use dust containing 1 percent rotenone applied with a rotary hand-operated duster at the rate of ½ pound per 100 square yards.

16. When setting and resetting is finished, destroy the remaining plants in the bed to help prevent diseases from spreading, and to help control insects.

Cryolite — Available Insecticide

Condensed from Pacific Rural Press

E. R. De Ong

THE rumors concerning shortages of spray materials have led many orchardists and gardeners to question the possibility of getting necessary supplies for the protection of their crops. Natural cryolite, an ore which is found in large quantities in Greenland, is one important insecticide that is apparently an exception to the present disturbed condition. This material will be available in such quantities as to meet the usual demands for it and also act as a "substitute material" for scarce rotenone, pyrethrum and arsenicals on many crops.

Cryolite is known chemically as sodium fluoaluminate. Natural cryolite carries a fluorine content of at least 49 per cent. The natural ore is ground as a dust or spray. For dusting purposes, it is usually diluted with talc, flour sulfur, diatomaceous earth and clays or other suitable carriers. It may be obtained from dealers in various concentrations suitable for control of various insect pests. No lime in any form should be combined with cryolite nor should any material containing free lime be mixed with it. The need of treating certain plant diseases and insect pests at the same time, may be met by combining cryolite with sulfur or some of the newer types of insoluble copper compounds, such combinations being available commercially.

The advantages of cryolite as an insectide include high toxicity to many chewing insects, a good margin of safety to the plant, good adhesion and chemical stability when exposed to strong sunshine and the weather. Soil experiments with cryolite, using as high as four tons to the acre with alfalfa as the test crop, has shown no harmful effect. Such experiments indicate a lack of danger to the soil from accumulation of cryolite after repeated applications.

The orchardists of the northwestern states have for many years used natural cryolite for the later cover sprays and lead arsenate as a calyx spray and perhaps one or two of the earlier cover applications, for the control of the codling moth.

Under California conditions, usually with a lighter spray program, cryolite has not come into general use. Experimental and

Reprinted by permission from Pacific Rural Press, San Francisco, Cal., Feb. 20, 1943

commercial work have both shown the value of natural cryolite as a control of codling moth in California and 1943 will probably show a decided increase in consumption both for apples and pears. The removal of undesired residues on the fruit is lessened by splitting the spray program, using lead arsenate in the calyx and perhaps the early cover spray and cryolite for later cover sprays. Local horticultural authorities should be consulted regarding the removal of fluorine spray residues.

The usual dosage is 3 pounds of natural cryolite per 100 gallons of spray. Choose spreaders and stickers with regard to local conditions.

Walnut

The recommended control for the walnut husk fly is a spray of natural cryolite as the fly is emerging about July 20th. A second treatment, applied as a dust, is made about one month later.

Truck Crops

LETTUCE: Cryolite is used almost extensively in the Salinas Valley for the control of the lettuce looper and the corn ear worm. Because of the high humidity in this district, arsenicals cannot be used on account of injury to foliage. Other lettuce districts where cryolite is already in use or may be substituted to an increasing extent, include the Imperial valley and Arizona.

TOMATOES: For the control of pinworms, cryolite is the only recommended material, the arsenicals not being effective against this insect. Cryolite is also a standard control for the tomato fruitworm on this crop.

Other vegetables and their pests for which cryolite is recommended include, the pepper weevil on peppers and egg plant; the lima bean pod borer on beans; asparagus beetle on asparagus; cabbage loopers and other leaf eating insects on cabbage, cauliflower, Brussels sprouts, and broccoli; Diabrotica beetles, cucumber beetles, and melon worms on melons, squash, and cucumbers; flea beetles on potatoes, beans and cucumbers.

The Victory Gardeners, as well as the truck growers, and the orchardists will find in the above lists uses for cryolite, both old and new, that will be helpful in many of their insect problems.

A Model for Marketing

Condensed from The Michigan Farmer

D. H. Stark

Extension Specialist, M. S. C.

MODEL for Michigan is the quarter century old system of truck concentration railroad shipping that is serving livestock producers in the vicinity of Grand Ledge. The Grand Ledge Cooperative Live Stock Shipping Association was organized in 1917 for the purpose of concentrating and shipping livestock to terminal markets, usually Detroit. The manager and members of the board of directors appreciate that farmers demand efficient and economical service.

Years ago, farmers in the vicinity brought their livestock to the association by wagons, later by trucks and trailers. However, the manager and board members agreed that the farmers' own association should give farmers the same pick-up service they were being offered by truckers coming directly to the farms.

In 1933 the association bought a truck and established pick-up service in combination with railroad shipping. That combination gave the farm-to-farm service and added the efficiencies of grouped rail shipments. Transportation costs were considered major items in the marketing of farm livestock. This system did not prevent the farmer from delivering his own livestock, but today more than two-thirds of the livestock listed with the association is picked up by the association truck.

Each week farmers having livestock to market call the manager and list the kinds and number of head. On Tuesday of each week the association truck and other local hired truckers pick up this livestock after the manager has carefully routed the trucks to save duplicate hauling. The pick-up service continues throughout the day until all listed livestock has been delivered to the association's local shipping yards at Grand Ledge.

When all livestock has been assembled, the manager and staff proceed to load it in railroad cars in the most advantageous manner. Double deck freight cars are used when possible, always loading to maximum capacity with safety, to cut down commission and freight charges.

Reprinted by permission from The Michigan Farmer, Detroit, Michigan, June 20, 1942

Should the association have an overflow, that is, too much livestock for one or more cars, its truck delivers the balance to the terminal market. Experience shows it would not be economical nor advisable to put 5,000 pounds of livestock in a railroad car and cause shippers to pay freight on a minimum weight of 15,000 pounds.

According to Manager Leuthjohan the pick-up service was not established for profit to the association. Charges are nominal. Instead the pick-up provides a service that farmers wanted, and provides a volume of shipping which lowers the cost of marketing to every shipper. This service coupled with railroad shipping has kept up a steady and increasing volume of livestock being marketed through the association. In marketing livestock as well as other farm products a large volume of business usually decreases the expenses such as transportation costs, yardage and commission for selling at the Detroit stockyards. In this way, small producers receive the benefit of low marketing costs per hundred weight.

While the number of shippers having livestock each Tuesday varies with the marketing season, usually it will vary from 15 to 30 shippers. Oftentimes during the heavy fall marketing months there are few shippers to a carload. Even though there are only 2 or 3 shippers to a carload, each shipper receives the benefit of a quantity freight rate, lower commission and other market charges. Association leaders point out that commission and yardage charges are less when livestock is shipped by rail and the present system also is conserving trucks and tires.

Cooperative association leaders point out that during war times when the country needs efficient operations, those involved in marketing should keep in mind those measures which will keep an orderly flow of livestock to market in the most efficient manner. Some things to keep in mind are:

1. Careful operation of trucks and care of tires.
2. Largest number of hundred weight of livestock per mile travelled.
3. Limitations of trucks to most economical haul.
4. Elimination of cross hauling.
5. Voluntary economic cooperation among farmers in a community in organizing transportation facilities.

Raising and Marketing Squabs

Condensed from The Rural New-Yorker

Elmer Rice

SQUABS are enjoying a brisk demand; the New York and Chicago marketmen report daily clearings of all offered, and usually at premium prices. The wholesale ceiling price in the East was fixed in January experimentally at 57½ cents a pound for the white squabs. The retail offering is from 75 to 90 cents a squab. These figures of sale prices for squabs are considerably in excess of the prices paid for other poultry. For 50 years squabs always have led the poultry parade in price-per-pound obtained by both breeders and distributors. Many squab breeders have given up their flocks for army service or factory employment, and this shortening of supply is reflected in the markets. Following the last war, the wholesale price of squabs climbed month by month until $1.20 a pound was reached.

While the young of all pigeons are squabs, the market squabs are restricted to several varieties. The young of the so-called fancy or hobby or ornamental pigeons are too small to make headway in competition with the larger breeds. The squabs from the Homers, weighing about eight pounds to the dozen, were good in their day as nothing better was obtainable then, but they are too small now for the most desirable trade.

Hundreds of thousands of Homers were imported to the United States from Belgium prior to the first war and were widely distributed into every State. The rise of the White Kings began in 1918 and has continued in even greater volume since. This breed was produced in America by the crossing of several of the larger breeds, using some Homer blood also, and the colored feathers were gradually eliminated until now the progress of production is pure white plumage. Some breeders by constant selection of the best types of White Kings and the best feeders have developed the present commercial White Kings to extraordinary pigeon excellence. The breed now is distinguished by fast breeding of seven or eight pairs of marketable squabs yearly. The birds are docile, easily tamed, not so flighty as the Homers, and contented in captivity, having known nothing else. The universal practice of the same type of nestboxes, same style of feeding, same water and bath utensils, make the birds eas-

Reprinted by permission from The Rural New-Yorker, 333 West 30th St., New York, March 20, 1943

ily adaptable to any home where shipped. They breed every month of the year and their squabs can be marketed steadily. In September and October the production will slow up about one-half on account of the molt. Market prices generally run higher in the Winter months because the demand is greatest then for parties and banquets. Summer markets at resort places develop good prices. There is an excellent opportunity for marketing skill in these birds, attractive dressing and packaging always resulting in retail sales at advanced returns. A breeder who develops this marketing skill receives considerably more for his squabs.

The advantages for squab raising, in addition to the desirable prices obtained, are principally no night work, no artificial incubation, no feeding of youngsters, the parent birds attending to that; light mortality of young, light labor, no need of new blood every year, and no fear of mixed breeds, as the birds are kept under wire netting and not allowed to fly over the fields. Live squabs are in active demand by the Hebrew trade and by catering to this demand the operator avoids killing and plucking.

There are few pigeon ailments. They bathe in water, keep clean and do not rustle in the dirt. There is no need to change methods with the seasons. No range is necessary. Another advantage is that there is a market all the year. Climate is no bar; they may be raised anywhere. The plant grows as the business grows, and only small capital is needed. A building 10 to 20 and 8 feet high may be turned, by the use of wire netting, into two pens; each pen will hold 25 pairs of breeders. A pigeon breeds best in its own home. This fact makes it best practice to start with half a dozen or a dozen pairs of adult birds and breed one's own flock.

An alleyway four feet wide at the back of a pigeon house permits an operator to feed and water a house of 10 pens 100 feet long in 15 minutes, or one-quarter the time he would use if opening and closing doors and entering pens. A new development in the management of grain and water from the alleyway is to have the grain trough and water can waist-high. The pigeons inside the pen on the other side of the alleyway fly up three feet to both feed and drinking water. The operator fills troughs and cans without leaving the alleyway, which is wide enough for a wheelbarrow. A flock of several hundred pairs may be handled in this manner with labor of only an hour or two daily. The principal work is on those days when the operator kills, plucks and packs for market. The plucking at a large squab plant is gener-

ally done by hired help.

A pair of pigeons breed continually year after year under proper management. The secret of success is to watch the flock for the best producing and feeding pairs, save their young for breeders, discard the drones. The life of an active, faithful pair of White Kings of good parentage may run to as high as 15 years. There are records of even longer life of profit to the owner, but as a rule replacements are customarily made at from six to eight years at methodically-managed plants.

Pigeons are pickers and choosers in eating. It is almost impossible to get a balanced diet of mathematical grains into a pigeon as you can with a pig or cow. The usual grains for pigeons are wheat, corn, whole or cracked, or both, kaffir corn and peas. Peas are essential to a good production of eggs and squabs on account of their high protein content. Canada peas have been scarce and high, but they are in the best pigeon mixtures. Wrinkled peas and cow peas or peas of any kind are in constant use in pigeon lofts. Hempseed, formerly a pigeon delicacy, is seldom fed now on account of the Federal restrictions against its planting, the leaves being made into harmful cigarettes. It can be sold legally only if sterilized. This has resulted in prices three to four times the old price of hempseed, making its buying practically prohibitive.

Plan to Dry, Store and Can

Condensed from Eastern States Cooperator

O. H. Pearson

In charge of the Exchange's plant industry project in Feeding Hills, Mass.

HISTORY has a way of rolling backwards at times. Things have happened that make our private and national economy a blend of 1943 technological usage and 1843 private needs. Practically all the products of our highly industrialized and closely integrated national economy are now turned over to our armed forces.

Apparently the same thing is happening to civilian supplies of food for 1943-44 as happened to gasoline, fuel oil and coal, steel, aluminum and copper products and almost all other manufactured items last year. Production is

Reprinted by permission from Eastern States Cooperator, Springfield, Mass., Mar., 1943

better than ever, but nearly all is earmarked for the armed forces. Because so little can be expected from normal trade channels, it amounts to about the same thing as if the trade channels were much smaller or didn't exist in some cases. And that puts us back on common ground with our grandfathers. They got along; they brought up large, healthy, rugged families; and they did it with little material help from commercial sources. Fortunately, in many respects we are ahead of our forbears in medical services and public utilities, but as far as the fundamental point of eating enough to feel comfortable is concerned we have much in common with them.

From all indications the supply of fresh vegetables in 1943 will be ample for all possible needs, but the critical time will come in the winter and spring of 1944.

METHODS OF PRESERVING VEGETABLES FOR LATER USE

	Length of Storage Period Indicated				
					Store
	Can	Freeze	Dehydrate	Fresh	Dry (mature)
Beans					
Snap	x	x	x		
Lima	x	x	x		
Field					x
Soy	x				x
Beets	x			x (Apr. 1)	
Broccoli	x	x	?		
Cabbage			x	x (Mar. 15)	
Carrots	x		x	x (Apr. 1 or later)	
Celery				x (Dec. 15)	
Chard	x		x		
Corn, Sweet	x		x		
Cucumber	x				
Onion			x	x (Mar. 15)	
Parsnip				x (Apr. 1)	
Peas	x	x	x		
Pepper	x		?		
Pumpkin	x			x (Jan. 1)	
Rutabaga				x (Apr. 1)	
Potato				x (May 1)	
Spinach	x	x	x		
Squash					
Winter	x			x (Mar. 1)	
Tomato	x		x		
Turnip				x (Apr. 1)	

And to provide for comfortable eating then, considerable thought and effort must be spent now.

From present indications supplies of fresh and preserved meats to be available in our markets next fall will be less than normal. It takes more time to grow a steer than to grow a quarter acre of carrots. Therefore, a considerable amount of slack in the diet will have to be filled with vegetables. Dry field beans and soybeans offer some substitute for meat although not equivalent in enjoyment of a medium rare sirloin steak.

Primary attention must be given to the things which can be preserved for later use, rather than things which will be consumed in the fresh state. Not all vegetables lend themselves equally well to any one form of preservation and it is extremely wise to consider now the facilities which are available and the labor and time in relation to other scheduled operations.

There are four major ways of preserving foods: canning, freezing, drying, and storing. The important thing to be done now is the planning of the crop to be handled later.

Canning of beets, carrots, pumpkin and squash are relatively much more expensive than storing and are not recommended.

For storage as fresh vegetables, cabbage, beet, carrot, parsnip, rutabaga and turnip should be kept cool and moist. A root cellar with stone or brick sides and floor and so ventilated that the temperature is below 35° F. and the humidity is well up will keep these vegetables crisp and fresh without the necessity of burying in sand or leaves, but if the moisture supply is apt to be variable or low, keeping fresh with sand is required.

Squash, pumpkin or onion require on the other hand a dry storage and moderate temperatures of 40-45° F. Any condition that causes moisture to collect on the surface of these vegetables will hasten spoilage by rots. Potatoes keep best in highly humid cellars at 38-40° F. If you have storage facilities so that proper conditions will prevail, fresh produce can be stored for use well into the following spring, with a minimum of labor. By proper planning of one's program, much labor during the busy summer season can be saved if a program of storage for winter use can be developed.

The figures in the table below refer only to the amounts needed for an individual adult doing farm or heavy work, to have a supply of vegetables from October 1 to June 1. If the recommendations are followed at least four servings of vegetables besides potato would be available for every day. We can be fairly sure that

there won't be as many other things to eat, and vegetables are filling.

For use during the summer and early fall additional quantities of these crops and others should be planted. Most families should plan at least to double their plantings to provide for both the fresh and stored seasons. And this is important — very important — *at least the amounts indicated should be preserved or stored.*

Home dehydrators are being developed by the departments of horticulture manufacturers of Massachusetts State College, University of Connecticut, and University of Maryland. But from a labor standpoint and satisfaction in use, storage of root crops offers an economical way of having something to eat next winter.

This Table is a Modification of One Appearing in the Cooperater for March, 1941

Order of Known Value in Diet	No. of Servings Per Week	Pounds Per Adult Oct. 1–June 1	Feet of Row to Produce	Varieties
For Storage				
Potatoes	14	180	150	Green Mountain, Katahdin, Russet, Chippewa
Carrots	3*	22	25	Danvers, Imperator, Chantenay
Onion	2-3	28	30	Yellow Globe Danvers
Cabbage	4*	40	35	Penn State Ballhead
Squash	2	22	2 hills	Cushaw, Des Moines, Buttercup, Blue Hubbard
Rutabaga	1	10	10	L. I. Neckless, Macomber
Turnip	2-3	18	10	Purple Top White Globe, Amber Globe
Parsnip	1	10	12	Hollow Crown
Beets	1	10	10	Perfected Detroit Crosby
For Canning or Dehydrating				
Tomatoes	4	10 quarts	6 plants	Stokesdale, Marglobe, Pritchard, Rutgers
Chard	3	6 quarts	20	Lucullus, Fordhook
Spinach	3	4 quarts	40	Dark Green Bloomsdale
Snap Beans	2	6 quarts	30	Tendergreen, Brittle Wax
Corn	2	6 quarts	20 hills	Carmelcross, Golden Cross Bantam

*These vegetables can be used raw for salad.

Humus for Production of Horticultural Crops

Condensed from California Cultivator

R. E. Stephenson

HUMUS is important in the production of horticultural crops because of its physical, chemical and biological effects upon the soil. This statement is likewise true for all crops, though not quite as much emphasis is needed for some.

Horticultural crops, both fruit and vegetable, have a high acre value, and, therefore, justify considerable expenditures to produce both high quality and big yields. Abundance of humus in the soil contributes to both the yield and quality of product. There is no substitute for humus for this purpose.

Soils devoted to horticultural crops often receive considerable tillage which has a humus-depleting effect, without compensating treatments that provide for humus renewal. Therefore some special procedure may be advisable to provide the necessary humus materials. This may take the form of green manuring or purchase of suitable organic materials.

Some horticultural plants are sufficiently sensitive to soil conditions to justify more than the usual care in preparing the soil for the crop. When other treatments fail, organic materials may prove helpful. Digging out the soil and mixing with manure for some plants is a pertinent example.

Other horticultural crops (orchards) occupy the same land for a long time. The long growth period makes regular attention to the soil imperative. The effect of soil depletion on tree growth and production cannot usually be quickly overcome. It is important to avoid the adverse effects of a poor soil condition so far as possible in any period of the life cycle of the tree. Trees grown in soils adequately supplied with active humus are less subject to impairment by adversity.

Regular humus renewal does much to provide desirable physical properties in the soil for the nutrition and growth of all plants.

Systematic renewal improves soil granulation, increases noncapillary porosity and improves aeration. The good structure associated with abundance of active humus, increases water penetration from either irrigation or rain-

Reprinted by permission from the California Cultivator, March 6, 1943

fall and improves the storage of moisture in the root zone for crop use. Adequate humus renewal makes tillage easier and may reduce the amount of tillage required to provide a seedbed or to maintain an effective root bed. Humus depletion, on the other hand, may result in soil dispersion, followed by compaction and cementing. Clods form more readily and tillage becomes more difficult and expensive. Poor water penetration and a reduced capacity to absorb and hold crop water may follow. The soil ceases to be a satisfactory medium in which roots may develop and function.

These changes may follow the depletion of active humus when the inactive residue of old humus is relatively high. This is particularly true of old soils of heavy textures sometimes found in hill land orchards. The unfavorable soil condition may be associated with lack of development and poor functioning of roots and likewise with diminished and unprofitable harvests.

Poor, inferior soil drainage and sometimes waterlogging and inadequate aeration, are somewhat associated with humus depletion, and lack of those practices which provide for its renewal.

The most nearly ideal physical condition for a functioning root system results when actively decomposing organic matter is maintained by regular renewal at rates that are consistent with the available supply of suitable materials which, incidentally, is usually not as large as would be desirable for maximum crop yeilds.

Humus contributes in an equally important way toward improving the chemical properties of soils.

Organic materials, including humus, are effective purveyors of essential crop nutrients. Those liberated by decay and in part by a solvent effect associated with the rotting of organic matter, include nutrient elements of both the major and minor class.

Commercial fertilizers which must be used to supplement a too meager supply of soil nutrients, are most effectively used in conjunction with fresh organic materials, such as compost, manure and green manure. This has been demonstrated many times and in many sections of the country.

Old soils which may be relatively high in the inert or less active humus residue, sometimes become much more responsive when fresh humus materials are supplied. In such soils fertilizers may remain only partially effective without humus renewal.

Humus materials and the processes and changes which take place in their decay are capable of rendering toxins less potent in the soil. An example is the poison-

ing effect of spray residues, which has become a problem in some areas but is partially overcome by organic matter additions to the soil. On many soils this may not be an important function of humus.

No soil deficiency has yet been found but that it has been at least partially corrected by some kind of organic matter. Use of compost has reduced the need for additional minor elements, particularly boron, a lack of which has been entirely corrected when large amounts of compost were added. Organic materials contain some of all elements necessary for plant growth and in a relatively readily available form.

Nutrients chemically bound in the humus are prevented from loss from the soil while being maintained in a form that becomes available in the active crop growth periods. Humus contains nearly all the nitrogen, much of the phosphorus and sulphur, a large portion of the calcium, potassium, magnesium, iron, and some (often enough) boron, copper, zinc and manganese, all of which are nutrient elements likely to be reduced in both quantity and availability by failure to provide for adequate humus renewal. The importance of humus to maintain a healthy soil and crop relationship justifies this emphasis.

Humus has important biological effects contributing to the improvement of soils, which should not be overlooked.

Fertile soils are alive with essential organisms carrying on the processes that provide the soluble nutrients for plant root absorption. Roots and microorganisms of the soil function associably in regulating and controlling the soil reaction and absorption processes to a degree.

The fundamental process of nitrification is supported and modified by the return of organic materials to the soil. Legume residues rich in nitrogen are especially valuable for increasing the supply of available nitrate and essential minerals. Non-legume residues, such as straw, which are low in nitrogen should be applied to the soil in the fall so that rotting may occur during the dormant season to avoid competition for nitrogen which might becaused by activity by the soil organisms in the early stages of straw decomposition. Straw properly used is a most important by-product on many farms.

Nitrogen fixation, both symbiotic and nonsymbiotic, is an important process for supplying nitrogen to soils and is favored by those practices which renew and maintain the humus. Straw furnishes energy material for these valuable organisms. A combination of straw and nitrogen fertilizer has given larger crop yields

than any other treatment in some areas.

"Vitamin-like" substances so important to plant growth are produced by the action of micro-organisms on soil organic matter. Use of vitamin B_1 is little needed and would be of little benefit to plants grown on soils well supplied with organic matter. This as yet relatively unexplored field of importance to plant production, will no doubt take on greater significance as more information is gained about both the production and the functioning of "plant growth stimulating" vitamins in the soil and in the plant.

Several materials are suitable for renewing the humus of horticultural soils but often they are only partially or not at all utilized.

Cover cropping and green manuring furnishes a type of organic matter that rots quickly and liberates much nutrient. Green materials are richer in most of the important plant nutrients than are the mature plants. This is especially true of the nitrogen which is high in green plants. Green manures are valuable for keeping nutrients in circulation in a form available to the crop. These quick-rotting materals are valuable to use with straws which make effective mulches for surface soil protection but do not rot so quickly in the soil. Cover crops may have an additional function, in some cases, of eliminating tillage pans and of deepening the feeding root zone of the crop, as well as in saving and preparing nutrients for crop production.

Composts, which may be made from all types of plant residues that are free from insects and diseases or pernicious weed seeds, are of about equal value with stable manure. More composts are desirable on garden and field soils.

Stable manure, when properly handled, is satisfactory for humus renewal and should be conserved and utilized more effectively than is done at present. Probably half the fertility of manure is lost from exposure to leaching and hot fermentation on many farms. So far as possible these losses should be prevented and all the fertility returned to the land.

Such products as spent mushroom compost and sewage sludge are sometimes available and of value. Every such material when possible should find its way to the field or garden.

Spoiled feed, particularly legume hay, vetch and clover straw, and even good hay, have been used to advantage in renewing the soil humus. Spoiled, early-cut alfalfa is one of the best of organic fertilizers to supply both nutrients and humus.

Burning crop residues such as stubble, leaves and straw should be avoided except in rare cases

when there is a legitimate reason for use of fire. These materials returned to the soil and supplemented with fertilizer, will contribute materially to humus renewal and the maintenance of a highly productive soil.

No land should be left bare. If possible grow a cover crop which will save nutrients from leaching and later contribute some of the best of humus materials. When a cover crop cannot be grown the next best thing is to mulch with some kind of organic material—straw, manure, leaves, compost or whatever is available. These treatments are equally effective in conserving and improving the soil on the truck farm, orchard, victory garden, or any cultivated land.

Fish Meal — Its Production and Use

Condensed from American Feed Trade

J. J. Dorsey

A knowledge of the manufacture of a fish meal and the raw material from which it is made will show the reason for its scarcity. On the Pacific Coast, fish meal is made from sardines. These fish are not to be confused with the small canned sardines that come packed in oil; they are a large fish. By agreement they are not caught unless they average 8½ in. long and 13 in. fish are very common. Fish have been taken 16 in. long weighing over 1 lb. each; in some districts they are called pilchards.

They are caught upon the high seas by purse seine boats that have been developed for Pacific Coast conditions. These seine boats are powered with diesel engines and carry from 150 to 200 tons of sardines in the hold, and very frequently load up the deck. They are fitted with every convenience for the welfare of the personnel, which generally consists of the captain and eleven men.

In the northern part of the Pacific Coast fish are caught in daytime; on the California coast they are caught at night.

The seine boats leave port so as to arrive on the fishing grounds while it is very dark and as the boat travels over the sea all hands are on the lookout for fish, which can be seen by the phosphorescent glow in the water, which

Reprinted by permission from the American Feed Trade, February, 1943

looks like a dull red fire. As soon as the fish are sighted, the captain heads the boat towards them, sometimes circling the boat around to size up the school; he always is very skilled in selecting the proper sized school. If he decides there are enough fish to make a load, he orders the large skiff put overboard. The man in the skiff takes one end of the purse seine, securing the lines in the skiff. The seine boat then starts up slowly and makes a circle around the school of fish; as it circles, the net which has been carefully piled upon the table at the stern of the boat, is paid out into the water. The circle is completed when the skiff is reached.

The man in the skiff then passes the net lines to the seine boat. The net, which is 1,500 feet long, is now in the water, forming a large circle. It hangs in the water 150 feet deep like a curtain supported at the top by a myriad of large cork floats which are strung like beads on the cork line. At the bottom of the net curtain is the lead line, which has strung upon it the right number of small lead weights to hold the net straight. Below the lead line is the purse line, which is threaded through the purse rings. As soon as the lines are passed aboard the seine boat, the purse lines are put on the winch, which closes the bottom of the net just like pulling the string in the old time purse. The net and fish are then pulled close to the seine boat and the fish are bailed out of the net into the hold of the seine boat, the brail holding about half a ton of fish at a time. It does not take very long to get the fish in to the boat. As soon as loaded, the seine boat heads back for port and unloads its fish.. All this must be done while the fish are fresh, because fish over 15 hours old are scorned by the canneries and by the fish meal plants.

There is always an elevator ready to unload the fishing boat and as soon as the fish reach the raw fish tanks, the plant is ready to start operations. The fish meal plants are made large in order to handle the fish quickly before any spoilage can take place.

The first step is to cook, then press the cooked fish to recover the oil. The pressed fish cake is then passed through a fluffer to divide the pressed fish into fine particles for drying. From the dryer it is delivered into a grinding mill and is drawn from the mill by a stream of cold air and blown into a cooling cyclone, after which it is bagged and piled in the warehouse to temper for a few days before being shipped.

Whole fish have always been used in the manufacture of fish meal, with the exception of the small quantity coming from cannery offal. This also applies to

Alaska, where herring is used, as well as on the eastern coast where menhaden is used.

The Navy has now taken over a very large number of the largest fishing boats, creating a fishing boat shortage. It has also been necessary for them to put certain restrictions upon the fishing fleets' former methods of operation. This is one of the causes of the fish meal shortage.

The other reason is that the War Production Board has ordered that all the sardines or pilchards caught on the California coast must be canned. This means that none of it can be used in the manufacture of fish meal excepting the offal from the canneries.

The tonnage of fish meal made in California in 1921 was 6,317 tons. It jumped to 100,788 tons in 1941. All this meal was used as a protein supplement for feeding purposes. Using the average of 5% fish meal, this provided a balancing ingredient for 2,015,760 tons of feed for poultry and animals. This is an enormous tonnage of feed, and there is no equivalent available to take its place.

The tonnages of fish meal given are California's production, as that state is the largest producer. The Pacific Coast production, including California, was 136,000 tons in 1941.

Turkey Flock Nets $3.12 Per Bird

Condensed from The Dakota Farmer

THE demonstration turkey flock grown at the Williston sub-station made a good record in 1942.

This flock demonstrated in a practical way the results of correct brooding, care and management of growing turkeys under farm conditions.

On May 12th, 151 broad-breasted poults were started under an oil burning brooder. Turkey starter mash was used at the beginning. At about seven weeks they were gradually changed to turkey grower. They were allowed to run out in a sun porch during warm days.

At eight weeks they were put on one and a half acres of range consisting of oats, rape and sudan grass, with eight rows of corn planted on the west, north and east sides. The corn provided shade, wind protection and considerable feed. No turkeys had been on this range for four years. A range shelter furnished protection for the turkeys.

Turkey growing mash, fed in hoppers, was continued throughout the growing period. From eight weeks on whole oats and wheat were fed free choice in hoppers, and at 12 weeks millet was also provided. Commercial turkey fattener was substituted for the turkey growing mash during the last four weeks feeding period. During the 28 weeks growing period they consumed 46% mash and 54% grain.

From the 151 poults started, 142 were marketed. The mortality was 5.9%. Sixty-three, or 44.4% were hens and 79, or 55.6% were toms.

The 63 hens averaged 16.6 pounds live weight when marketed at 26 weeks. The heaviest hen weighed 18.3 pounds. Sixty-one, or 96.8% graded U. S. Prime or A.

The 79 toms averaged 27.5 pounds live weight when marketed at 28 weeks. The heaviest tom weighed 32.4 pounds. Seventy-four, or 93.7% graded U. S. Prime or A. Five, or 6.3% graded U. S. Choice or B. The average dressing shrink of the toms was 10.5%. The average dressing shrink for the entire flock of toms and hens was 10.9%. The shrink from warm to cool dressed weight was 1.3%.

The average feed consumption for toms and hens for 28 weeks growing period was 96.35 pounds

Reprinted by permission from The Dakota Farmer

per bird. It required only 4.36 pounds feed per pound gain in weight.

Following is itemized the cost of growing the turkeys:

151 Poults	$ 87.00
75 gallons Kerosene	12.00
142 Dressed at 15 cents	21.30
	$120.30

All feed was purchased, therefore the purchase price of the feed is figured, and not the farm price.

1500 pounds Turkey Starter	$ 64.50
4550 pounds Turkey Grower	168.35
74 bushels Oats	31.18
30 bushels Wheat	31.50
70.5 bushels Millet	59.85
480 pounds Turkey Fattener	15.35
	$370.73

The total cost was $491.03 or an average cost of $3.46 per bird.

Return $6.58 per Bird

The hens and toms sold for $.34 per pound for U. S. prime or grade A, and $.30 per pound for U. S. choice or grade B at Williston. The hens were included in the Thanksgiving pool and the toms in the Christmas pool. The 63 hens sold for a total of $300.24 or an average price per bird of $4.76. The 79 toms sold for a total of $633.87 or an average price per bird of $8.02. The entire flock of hens and toms brought $934.11 or an average price per bird of $6.58.

Net $3.12 per Bird

When the total cost of $491.03 is subtracted from the total return of $934.11 it leaves $443.08 or an average of $3.12 per bird. This figure represents the net income per bird after deducting the cost of poults, fuel oil, feed, and dressing at the plant when they were marketed.

Our Soils in Selected Service

William A. Albrecht

Soils Department, College of Agriculture, University of Missouri

Presented before the annual meeting of Missouri State Horticultural Society, Kansas City, Missouri, February 16, 1943

THE fertility of our soils needs to be considered as the resource that has been paying the bill for much that we, both as individuals and as a youthful nation, have enjoyed in what may well be called "past prosperity." It was the payoff, going on quietly for some time in the form of squandered potentialities of our soil, as they were encouraged by the unearned increments in farm investments, that brought us to a rather jittery condition in the serious depression following the first World

War. The financial structure built on these unearned increments and false land values collapsed suddenly when farm values had to be based on soils rather than sales.

Within less than two decades numerous national, almost catastrophic, experiences have made us soil conscious. The maximum of floods and the worst of droughts in our history befell us. The first World War, under need of intensive food production, gave us maximum soil exploitation and subsequently the worst dust bowl explosion. Fluctuations in land values reshaped our whole economic structure in a sudden and tremendous financial depression that reshuffled the cards for a new deal, particularly in matters economic and social. A second World War is now the occasion for still greater food production, but, fortunately as yet, under extensive soil conservation, even if such conservation is occasioned at tremendous costs to the Federal treasury.

Before undertaking to deal in further detail with the subject of selected service by our soils, it will be helpful to develop our concepts of the following: (a) how soils come about, (b) how different they are in different places, (c) how, in consequence of climate, they serve differently in their nourishment of all life, plants, animals, and humans, and (d) how they may be selected for better service in view of such information.

Soils develop from different rocks under variable climatic forces. In considering the origin of our soils, it is unnecessary to start with the rock as it was just cooled out of its original molten form. We need not report all the details during the geological time involved in grinding rocks finely enough to give us the sand and the silt of the soil, or in weathering these to the sticky clay. Let us begin, instead, with the glacial deposit, known as boulder clay, in the well ground mixture left by the receding glacier that is the soil foundation of the fertile cornbelt. More simply, we might use the grinding forces of the arid Northwest in almost complete absence of the leaching effects of rainfall to give us silts. These were brought down by the Missouri River and spread out over its wide bottoms. Imagine these silts in the dry river bottom during the low river stage to be picked up from there by the prevailing southwesterly winds and dumped on top of the bluffs. The coarser particles with a more calcareous nature were deposited by this salt-shaker-like action in greater depths on the higher bluffs over topography originally rolling. With increasing fineness of the silt, according to greater distance northward, eastward, and northeastward from the river,

this blanket of loess becomes thinner. It undergoes by these distances, at the same time, changes in kind or chemical nature of the minerals to give us different soils with silty surfaces over much of north Missouri as the result of wind action. Here then we can start with a geological, windborne deposit and trace its development in chemical and physical changes to give us soils according to different climatic forces in different localities.

Differences in soil development mean different soil properties. If this loess, or bluff, soil, so bountiful in fruit production in such a limited stretch were to extend itself under a wide range of increasing rainfall and also of increasing temperature, it would provide an array of widely different soils. Even the small increase in the intensity of the climatic forces in going from these bluff soils in Northwest Missouri to those in the southeastern part of the state is enough to give loess soils in Andrew or Buchanan counties that are different from those in Cape Girardeau. The low rainfall of the western United States means a weak weathering force to develop even finely ground rock, to say nothing of its greater weakness in weathering this into a soil. As one goes eastward across the central states to higher annual rainfalls there are more intense climatic activitiies in forming soil. With still more rainfall there may be soil development to the point of its depletion, particularly as higher temperatures accompany the rainfall in going southeastward. Here in this travel across the continent there is, first, a soil development that is mainly synthetic or constructive with soils becoming richer in clay and organic matter and consequently more fertile; and second, a soil development that is mainly destructive through increasing soil acidity, loss of organic matter and greater degrees of weathering that consequently gives less fertile soils.

By using approximately the meridian of longitude at 97° West, passing between Manhattan and Salina, Kansas, as the dividing line of the United States, the soils to the west might be said to be insufficiently developed. They have not weathered away sufficient of the non-nutrient silicate portion to concentrate highly the less soluble nutrient portions as, for example, the phosphorus. These western soils, or "pedocals" as they are called, are still lime-rich. They are characterized by their prairie vegetation. They are well stocked with nitrogenous organic matter developed in consequence of this lime and mineral store permitting legumes. They till easily in consequence of their complete and stable granulation. This is a condition that was

brought on by their escape from leaching by excessive rainfall.

To the east of the dividing line, in humid climate, the soils are deficient in lime with a dominance of iron or aluminum moved downward as the lime went out. These soils are called "pedalfers" in the soil man's language. They contain more clay and, in consequence of the lack of its granulation, cultivate more heavily. They had a virgin forest vegetation when the pioneer began taking them over.

The cooler, but rainy regions of the northern part of the eastern half of the United States produced gray soils of decidedly acid nature, with a particular type of clay that retains acidity. This is well known by the wide extent of the acid, claypan soils through that region. The much warmer and, also more rainy regions in the southern part of the eastern half, produced reddish soils. These are of even higher but uniformly distributed clay contents. The clay is, however, of a different chemical nature. It does not hold acidity as do those clays weathered in the cooler climates farther north. Its holding capacity for nutrients is likewise correspondingly low.

The development of soils from pulverized rock minerals is then first a constructive process with increasing intensity of the climatic forces up to a certain degree. Construction reaches its maximum in the black soils of the eastern Dakotas and western Minnesota as the northern part of the so-called "chernozem" soils extending southward in a belt through Nebraska, Kansas, Oklahoma, and Texas. With the still greater intensities of both the climatic forces, rainfall and temperature, the soil development is more destructive than constructive. There is more destruction of the supply of both unweathered minerals in the silt and of the nutrients held on the clay for plant use. It is also more destructive of organic matter through the higher rates of its decomposition under more rain and warmer weather. It is on these accounts that the properties of soils differ with differences in the soil's development according to climate.

Differences in soils may be very discriminating in their services. Will not our soils be in selected service in more cases than we now believe when we fully understand the functions by which soils supply nourishment to create different crops? These are questions that, if answered, will make us still more soil conscious and help us use these answers more wisely in solving our pressing production problems.

Mechanisms by which soils feed plants

When a soil contributes the 5 to 10 per cent as plant ash to create vegetation, what is the mech-

anism by which this delivery is so effectively made in some plant cases and so ineffectively in others? This is a question that challenges our better understanding. Studies using the colloidal acid clay of the soil as a controlled means to feed legume plants have clarified our knowledge about the process. By their total mass of growth; by their use of nitrogen from the air; by the variations in the concentration of their more proteinaceous constituents in reciprocation to the concentration of those more carbonaceous; by all of these behaviors in relation to the nutrients absorbed but available in the clay, these plants and their performances have helped us to understand the soil and plant mechanisms that move nutrients from soil to crop. They tell us in simplest language, that plant feeding by the soil is mainly a matter of barter or exchange between the plant root and the nutrients adsorbed by the clay or held on the surface of the clay in an exchangeable but not leachable form.

Can the plant exchange to the clay any of its nutrients for others it needs, or what has the plant to offer in the soil market place for nutrients adsorbed and available on the clay? This is an interesting question. When a plant takes calcium or lime, potassium, magnesium, and other alkaline ash elements, all carrying positive electric charges, it is trading, or offering in exchange, acidity in the form of hydrogen that carries the same positive charges. Possibly it has also some unknowns to exchange. Here is the reason why cropping makes soils sour. It means, too, that acidity is not a dangerous soil condition so much because hydrogen as acidity has come in, but rather because the plant nutrients have gone out. The incidence of the acidity bespeaks the exhaustion of the soil fertility, not only in terms of the calcium to be replaced by liming, but in the many other nutrient elements less prominent, but no less essential.

If the clay, however, in our soils were the only source of plant nourishment, its contribution to a single crop might be sufficient, in terms of the hydrogen accepted in exchange, to increase the soil acidity 100 times. Such a contribution would represent half of the total fertility store on the clay. Even though such excessive acidity occasioned in the exchange might be temporarily induced, it certainly can not be permanent. We know full well that our soils are not exhausted of their producing capacity after only two crops. Recent studies by Dr. E. R. Graham, of the College of Agriculture, University of Missouri, have demonstrated that the acidity coming to the clay from the plant roots is passed on to the silt

and sand minerals. These minerals are thus broken down or weathered. They give up then or exchange, for the acidity, their calcium, potassium, magnesium, and other similar nutrients. While the clay is serving as a jobber in passing hydrogen, a non-nutrient, as acidity from the plant roots to the unweathered rock minerals, it is passing their offerings of nutrients in the opposite direction to the plants. In these chemical mechanics there is the explanation of the plant's trading business wherein it drives the hard bargain of getting nutrients for the non-nutrient offered in trade.

We can thus see three factors, first the amount of clay, second its chemical nature, and third the stock of nutrients in the silt and sand minerals in any soil; and this all comes into the question of the selected service by the soil as a deliverer of the substances from which plants initiate the greatest chemical business of fabricating air and water into the necessities for the higher forms of life. We can also comprehend now why soils that have been "rested" recover in their production, or why spring plant growth is richer in mineral nutrients than late summer growth. These instances of soil exhaustion by excessive cropping or by late season crop growth are cases in which the forces of the plant roots acting on the clay run ahead of the rate by which this jobber can get its orders filled and make delivery from the silt minerals or the soil reserve. The soil activities during the rest period, or during the winter, in deliverng nutrients from the silt to the clay in plant absence, even though slow, do much to hustle the plant growth off when seeds are planted in the spring. Here may be the quiet soil performance that serves as reason why animal reproduction comes mainly in the spring or the time when the plants can deliver minerals and growth substances in concentrations high enough per mouthful of feed to meet the demands of milk production. Other soil performances and similar mechanisms in plant and animal nutrition may be likewise related so as to select or discard the soils for particular service.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Beekeeping — By Everett Franklin Phillips, Professor of Apiculture, Cornell University. The Macmillan Co. $4.00.

Breeding Your Own, or Raising Colts for Pleasure and Profit — By Clarence E. Bosworth. The Derrydale Press ($10.00). A book suitable for the breeders of hunters' and saddle horses.

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. The Macmillan Co. $3.90.

Dairy Science—By W. E. Petersen, Ph.D., Assoc. Prof. and Assoc. Dairy Husbandryman, Univ. of Minn. Edited by R. W. Gregory. J. B. Lippincott Company (1939). $4.00.

Farm Accounting—By Donald R. Mitchell, Asst. Prof. Agri. Economics, Univ. of Wisc. McGraw-Hill Book Co., Inc. (1941). $2.50.

Farm Shop Practice—By Mack M. Jones, M.S., Prof. Agri. Engineering, Univ. of Mo. McGraw-Hill Book Co., Inc. $2.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. The Macmillan Co. $2.90.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing—By V. B. Hart, Ext. Professor of Farm Management; M. C. Bond, Ext. Professor of Marketing; L. C. Cunningham, Ext. Asso. Professor of Farm Management; all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Grow Your Own Fruit—By M. G. Kains, formerly with U. S. Dept. of Agriculture; Professor of Horticulture, Pennsylvania State College. Charles Scribner's Sons. $3.50.

Hunger Signs in Crops—Published by the American Society of Agronomy and The National Fertilizer Association. $2.50.

Home Vegetable Gardening—By Charles S. Nissley, Extension Horticulturist in Vegetable Growing. Rutgers Univ. Press (1942). $1.50.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Judging Handbook—By Julius E. Nordby, Asst. Prof. Animal Husb., Univ. Idaho, and W. Malcolm Beeson, Ph.D., Asst. Prof. Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw-Hill Book Co., Inc. $4.00.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Practical Poultry Management—By James E. Rice, Emeritus Professor of Poultry Husbandry, and Harold E. Botsford, Extension Professor of Poultry Husbandry, both at New York State College of Agriculture. Fourth Edition (1940), John Wiley & Sons, Inc. $2.75.

Practical Horse Breeding and Training — By Jack Widmer. Charles Scribner's Sons (1942). $3.00.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue University. The Interstate Printers & Publishers. $1.80.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of the Horse—By George R. Conn, B.S.A.H., D.V.M., Orange Judd Publishing Co., Inc. (1942). $1.50.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

Soybeans—Gold from the Soil — By Edward Jerome Dies. The Macmillan Co. $1.75.

The Western Horse—Its Training, Type and Marketing. By John A. Gorman, Asso. Prof. Animal Production, Univ. of Wyoming. The Interstate Printers and Publishers. $1.65.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

Vegetable Crops — By Homer C. Thompson, Ph.D., Prof. Veg. Crops, Cornell Univ. McGraw-Hill Book Co., Inc. $5.00.

BOOK NOTES

SHEEP—By Levi Jackson Horlacher, Professor of Animal Husbandry, University of Kentucky, and Carsie Hammonds, Professor of Agricultural Education, University of Kentucky.

This book presents in simple language the most approved methods in sheep production and management. It should be of value to those already engaged in sheep production as well as to those whose experience may be limited. Arrangement of the book makes it easy for the busy reader to find what he wants.

Publishers: The Interstate Printers and Publishers. $2.00.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

INDEX

Beef Cattle

Cow Housing Experiment ..... Mar., 1942
Feed Lot Equipment ..... April, 1942
Lower Beef Costs ..... May, 1942
Fitting Steers for Show ..... May, 1942
Why Creep Feed Calves? ..... June, 1942
Figuring the Farm's Beef Power ... July, 1942
Let Performance Be Your Beef Guide, Aug.-Sept., 1942
What War Means to the Cattle Feeder, Oct., 1942
Proving Beef Sires ..... Oct., 1942
Easier Cattle Feeding ..... Nov., 1942
Short-fed Cattle Mean More Profit . Nov., 1942
Profit or Loss in the Cattle Business . Jan., 1943
Cattle Hides ..... Jan., 1943
With Emphasis on Roughage ..... Feb., 1943
America's Meat Power Develops ... Feb., 1943

Conservation

Contour Lines ..... July, 1941
Cover Farming ..... Oct., 1941
Power Weed Burner ..... Oct., 1941
The Land and the People ..... Nov., 1941
An Anthology ..... May, 1942
Fence Row Facts ..... June, 1942
Conservation Farming and Yields . July, 1942
A Piece of Land ..... Aug.-Sept., 1942
Plow Method of Terrace Construction, Oct., 1942
Conserve for Production ..... Nov., 1942
Nutrient Quality of the Soil ..... Jan., 1943
Halt Stream Bank Erosion ..... Jan., 1943

Crops

A New Legume-Lotus Corniculatus . Sept., 1941
One Man Looks at One Weed ..... Nov., 1941
Brome Grass ..... Nov., 1941
Piper Velvet Bent ..... Nov., 1941
Little Beans—Big Business ..... Dec., 1941
New System Farmer ..... Dec., 1941
New Control for Corn Ear Worms . Dec., 1941
High Cotton Yields ..... Jan., 1942
Crop Insurance Dollars ..... Feb., 1942
Cotton Grown to Measure ..... Feb., 1942
Modern Rain Makers ..... April, 1942
Kudzu—Mender of Tattered Lands, April, 1942
Mystery Fiber Produced in Florida . April, 1942
Seed Treatment for Cereals and Corn, May, 1942
Which Forage Crops? ..... June, 1942
Fertilizing Corn ..... June, 1942
More Flax ..... June, 1942
New Crop for the South ..... June, 1942
Sudan Grass ..... June, 1942
Extending the Life of Clover Stands, Aug.-Sept., 1942
Start Alfalfa in August ..... Aug.-Sept., 1942
Bromegrass ..... Nov., 1942
100 Bushels of Corn on Old Land . Jan., 1943
Hemp—Our Forgotten Crop ..... Jan., 1943
Copra ..... Jan., 1943
Use Legumes in Seeding Mixtures April, 1943

Dairy Cattle

Artificial Udder Growth ..... June, 1942
Vitamin C for Sterility ..... June, 1942
Frequency of Milking and Production, June, 1942
Ten Calves per Year from One Cow . July, 1942
Heavier Grain Feeding to Increase Milk, July, 1942
Birth Control in the Cow Barn . Aug.-Sept., 1942
Barn Slaves Revolt ..... Aug.-Sept., 1942
New Methods in Dairy Cattle Feeding, Aug.-Sept., 1942
Experiences in Breeding ..... Aug.-Sept., 1942
Care of Milking Machines ... Aug.-Sept., 1942
Breeding Goats for Winter Milk, Aug.-Sept., 1942
Why Do Cattle Bloat? ..... Aug.-Sept., 1942
White Scours ..... Oct., 1942
Milking Machine Put on Time Schedule, Oct., 1942
Grazing Habits of Cows ..... Oct., 1942
Milk Production of Cows ..... Oct., 1942
The Udder and Mastitis ..... Nov., 1942
Building a Foundation Herd ..... Nov., 1942
Feeding Vitamin A to Dairy Cows . Nov., 1942
Influence of High Fat Intake ..... Nov., 1942
Better Breeding Reduces Milk Costs . Jan., 1943
Milking Machine Sanitation ..... Jan., 1943
Proteins, Minerals, Vitamins for Reproduction ..... Jan., 1943
Sweet Clover in Texas ..... Feb., 1943
New Hormone Works Wonders .... Feb., 1943
Water and Your Dairy Cattle ..... Feb., 1943
More Milkings—More Milk ..... April, 1943
Milking Machines—Washing and Care, April, 1943

Farm Machinery

Portable Lumber Harvester ..... Oct., 1941
You Can Ventilate That Stable ..... Jan., 1942
Tooling Up for Soil Conservation ... Jan., 1942
Speed in Farming ..... Jan., 1942
Bale-Chute Saves Labor ..... Jan., 1942
Farm Machinery in 1942 ..... Mar., 1942
The Most from a Gallon of Gas ... Mar., 1942
Push Button Barn Cleaning ..... Mar., 1942
How to Make the Mower Work Better, June, 1942
Device Saves Baling Wire ..... June, 1942
Good Tractor Care ..... June, 1942
New Methods Save Labor in Haying, July, 1942
The Sweep Rake ..... July, 1942
Cutting Labor Corners ..... July, 1942
What Shall I Charge ..... July, 1942
Tractors in Wartime ..... Aug.-Sept., 1942
Farm Machines Fight for America .. Jan., 1943
Take Care of Your Machinery ..... Jan., 1943

Fruit

Pruning Peach Trees for Early Production, Feb., 1941
What Do Apples Cost? ..... March, 1941
4-Leaf Clover System of Pruning . March, 1941
Date Growing ..... April, 1941
The Papaya in Florida ..... May, 1941
Soil Management in Orchards ..... June, 1941
The Carob Tree ..... July, 1941
Growing and Drying Prunes ..... Aug., 1941
New Spray for Apples ..... Dec., 1941
Modifying Biennial Bearing in Apples, Jan., 1942
Planning a Nut Orchard ..... Jan., 1942
Is Your Sprayer Ready ..... Feb., 1942
Economy in Pruning ..... Mar., 1942
Cover Crop Problems in Orchards . July, 1942
Pruning Abandoned Fruit Trees ... Jan., 1943
Pruning Peach Trees for Production . Feb., 1943

INDEX

Fertilizers

A New Fertilizer Development.....Aug., 1941
Limestone—A Fertilizer .....Sept., 1941
Hunger Signs in Crops .....Oct., 1941
Organic Matter .....Nov., 1941
Calcium-Bearing vs. Neutral Fertilizers, Dec., 1941
It's the Calcium—Not the Alkalinity, Mar., 1942
Fertilizing for Permanent Hay.....July, 1942
Fertilizers Will Help .....July, 1942
Lime Becomes Part of Soil.....Oct., 1942
Manure Yields Profits .....Jan., 1943
Putting Fertilizer in Its Place.....Feb., 1943

Hay

Of 13 Ways of Making Hay .....June, 1942
Hay Cutting Time Vital .....July, 1942
Quality in Grasses for Pasture and Hay, April, 1943

Hogs

Handsome Is as Handsome Does...Feb., 1942
Increasing Pork Production .....Feb., 1942
Sow Pregnancy Test .....Mar., 1942
Pork Progress .....April, 1942
Protein Supplements for Hogs....April, 1942
Baby Pig Disease .....May, 1942
Production Testing for Hogs .....June, 1942
Vitamin B in Swine Nutrition.....July, 1942
Fitting the Show Herd .....Aug.-Sept., 1942
Record of Performance for Swine...Oct., 1942
Make Hogs Heavy for More Profit..Oct., 1942
Guard Against Soft Pork.....Oct., 1942
New Hog Cholera Vaccine .....Nov., 1942
Hogs on Concrete .....Nov., 1942
Something New in Pigs .....Nov., 1942
The Sow Herd in Winter.....Feb., 1943
Get Them off to a Flying Start ...April, 1943
Production Testing as a Basis for Selection, April, 1943

Horses

Remount Service Breeding Plan ..April, 1942
Watch Out for It .....May, 1942
Power of the Horse .....June, 1942
Wild Horses of the Plains.....July, 1942
Care of the Brood Mare.....Aug.-Sept., 1942
Cooperative Selling .....Aug.-Sept., 1942
Value of Good Roughage for Horses..Oct., 1942
Jacks and Mules .....Jan., 1943
Shoeing and Shoes .....Feb., 1943
Cutting Horses .....Feb., 1943

Pastures

A Pasture That Does Not Take Annual Leave .....Feb., 1942
Grass Is Money .....Feb., 1942
Pasture Champions .....Mar., 1942
The Search for Better Grass.....Mar., 1942
Good Pasture Management Pays..April, 1942
Good Pasture Returns Dividends...May, 1942
Planning the Use of Pasture ..June, 1942
Combination Legumes for Grazing, Aug.-Sept., 1942
Grass Varieties to Improve Western Range, Oct., 1942
A Believer in Grass .....Jan., 1943
Clover Pastures for the Coastal Plains, Jan., 1943
Permanent Pastures in the South..Feb., 1943
Cow Cafeteria and New Grasses...April, 1943

Poultry

Saving Labor on the Poultry Farm..Mar., 19
Breeding in Step with Feeding ....Mar., 19
Selecting Breeders .....April, 19
R.O.P. and the Progeny Test ....April, 19
New Facts on Cannibalism .....May, 19
Finding Substitutes .....May, 19
Better Quality Eggs .....June, 19
Dried Eggs .....June, 19
Profitable Air Conditioning.....July, 19
Getting Summer Eggs.....July, 19
Chickens on Shares .....July, 19
Sulfur and Charcoal Prevent Coccidiosis, July, 19
How Much Did Those Pullets Cost? Aug.-Sept., 19
Chicks Out-of-Season .....Aug.-Sept., 19
Store Eggs for Lean Months..Aug.-Sept., 19
All Out Production from the Pullets..Oct., 19
The Trask Plan .....Oct., 19
Fall Chicks .....Nov., 19
Cull Your Hens All the Time.....Nov., 19
A Boom in Feathers .....Nov., 19
Finishing Turkeys for Market.....Nov., 19
A Little More Room, Please.....Nov., 19
Goose Raising .....Nov., 19
A Triumph for Turkey Tenancy....Jan., 19
More Chicks per Hen .....Jan., 19
Reduced Feed Costs for Poultry...Feb., 19
New Feeds and Feeding Methods...Feb., 19
Do You Have a Halfway Flock?..April, 19
Electric Brooder Care .....April, 19

Sheep

Lamb Credit per Ewe Weight .....Dec., 19
Box-Type Lamb Brooder .....Mar., 19
Sheep Production Programs .....April, 19
Self-feeding of Fattening Lambs ..May, 19
How Much Roughage for Sheep? ..June, 19
A Production Test for Sheep.....July, 19
Flying Sheepskins .....Aug.-Sept., 19
Commercial Lamb Feeding...Aug.-Sept., 19
More Profit from Sheep on Range..Jan., 19
Maintaining the Farm Flock.....Jan., 19
A Sheep Feeder Checks on Supplements, Feb., 19
Suggestions for Southern Sheepmen April, 19
It Will Save the Lambs.....April, 19

Silage

Storing Grass Silage .....Feb., 19
Place of Grass Silage .....March, 19
Sweet Clover Silage .....June, 19
New Methods for Grass Silage....Sept., 19

Vegetables

Spray Groups .....June, 19
Lime Preferences of Plants.....June, 19
High Quality Celery .....July, 19
More Lime for Vegetables .....Dec., 19
Growing Winter Rhubarb .....Feb., 19
Tenants Share Garden .....Feb., 19
What's New in Vegetables for 1942..Mar., 19
How a Champion Grows Tomatoes..April, 19
Fertilizing for Better Vegetables...May, 19
Should Potatoes Be Planted Thick or Thin? May, 19
Using Blitzkrieg on Weeds ..Aug.-Sept., 19
Growth Regulations for Celery.....Feb., 19
Something New in Plant Growing..April, 19

F.F.A. PRIZE ESSAY CONTEST

open to the

FUTURE FARMERS of AMERICA

The FARMERS DIGEST announces a Prize Essay Contest for F.F.A. boys!

SUBJECT: "The F.F.A. Contribution to National Defense"

First Prize—Thirty-five Dollars

Second Prize—Fifteen Dollars

Honorable Mentions — One-Year Subscription to the Farmers Digest

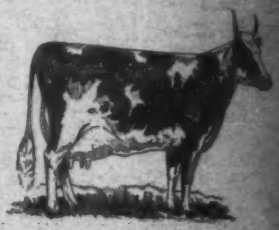
CONDITIONS OF THE AWARD:

1. All articles submitted in the contest must be original.
2. Articles must not exceed 1,500 words in length.
3. Articles must be typed, with double spacing, on one side of the page only.
4. A stamped and self-addressed envelope must accompany the article if the author wishes to have the manuscript returned.
5. All articles must be received at the Editorial Offices of the Farmers Digest, Ambler, Pa., on or before June 1, 1943.
6. A letter from the Vocational Agricultural Instructor should accompany the article confirming the contestant's membership in the F.F.A.
7. Awards will be announced in the August issue of the Farmers Digest.

The Farmers Digest

Presents Each Month Facts about Some Outstanding Agricultural Magazine

THE AYRSHIRE DIGEST



Official monthly magazine devoted to the interests of the Ayrshire breed was founded in 1915. Arthur H. Sagendorph, then and now owner of Alta Crest Farms, Spencer, Massachusetts, and James G. Watson, now editor of **The New England Homestead**, had charge of the founding and early development of this magazine.

Any item of interest to Ayrshire breeders, improved farming or dairying in general, or the economic, scientific, or practical phases of dairying is eligible for a place in its columns.

Detailed reports regarding the Ayrshire Herd Test and the herds, sires, and dams that have come to the front by this method of testing are given a conspicuous place. Historical articles regarding the background of the breed, scientific management methods, the improvement of pastures, feeding, disease control, and the selection of breeding stock are all treated periodically. Success stories regarding prominent or little-known breeders are also featured.

The Ayrshire Digest was the first breed publication to wage a campaign in favor of the recognition of calfhood vaccination.

Outstanding issue of the year is the special holiday number which usually contains from 120 to 160 pages and is liberally supported by breeder advertising.

Subscriptions should be forwarded to **The Ayrshire Digest**, Brandon, Vermont, C. T. Conklin, editor and business manager. The subscription rate is $1.50 for one year or $2.50 for two years.

The above is printed for the information of our readers, and as a courtesy to the sources of our information.

The Johnson Press, Ambler, Pa.